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Thursday, March 12, 1981

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Net/One to be used in Case local network

by Donald Kennett

CASE is to use Net/One from Ungermann-Bass in the US as the local networking element of its recently announced Casenet networking scheme.

A three-year agreement, under which the Rickmansworth data communications company expects to buy at least £200,000 worth of network modules a year from Ungermann-Bass, was announced last week at a seminar designed to introduce Casenet to some of the company's main customers.

Case sales director Mike Haferty said he expected the first trial systems to be installed this autumn, probably in the City of London, and further modules of Casenet would be announced next year.

Ungermann-Bass vice-president Charlie Bass said he thought that future networks would implement the ISO open-networking model, although few did currently. Ethernet, on which Net/One was based, did not conform to the model because it was designed before the model was developed. But Net/One did the job of the first four levels and Case would add the functions of the higher levels.

Standards were not very much in evidence in local networking, said Bass. Ethernet was a de facto standard developed by Xerox and endorsed by Intel and Digital Equipment. It had now been adopted by Hewlett-Packard, Nikdorf, Olivetti and Zilog and it was likely to have a significant impact on the market.

The Institute of Electrical and Electronic Engineers, which set many standards in the US, had been working on two alternative strategies for local networking. One, based on contention for channel capacity by the attached devices, was similar to Ethernet and was likely to be ignored because Ethernet already existed as a standard.

The other, based on non-contention or guaranteed delivery, was less well-developed but was likely to have some effect in broadband networking where data was transmitted on a modulated carrier frequency and shared a cable with, for example, television distribution.

The American National Standards Institute and the International Standards Organisation were likely to say something dramatic on local networking in the next year, but had not played their hand yet, Bass said.

BASS: "standards are not much in evidence in local networking."

matic on local networking in the next year, but had not played their hand yet, Bass said.

Ethernet has its limitations, Bass conceded, and for that reason his company planned to provide alternatives at the lower levels in future. Its strategy had been to

separate the transmission medium from the equipment implementing the access technique, so as to allow changes within the life of the product. One office with a baseband network and another with a broadband network should present identical characteristics to their users.

Shelton launches Sig/net

by Donald Kennett

HAVING designed the Nascom 1 and 2 personal computers under contract, London-based design consultancy, Shelton Instruments has launched a system called Sig/net under its own name aimed at both the industrial control and small business system markets.

Shelton feels that the 26-wire ribbon-cable interconnection system on which it is based could rival the S-100 bus in its appeal to system builders, claiming that it is cheaper and easier to add extra RAM memory and implement special interfaces.

The first five basic modules will

be available from the beginning of next month, either separately or packaged as a desk-top business system running CPM, with a 4MHz Z80 processor, 64K-bytes of RAM, two 5¼-inch single-sided double-density Tandon floppy disc drives and two V24 serial ports, priced at £1,299.

Tory MP calls for more robots

by Chris Youett

A MIDLAND MP is pressing the government to help industry make more use of robots. Iain Mills (Tory, Meriden) said: "The runaway success of the Mini Metro has shown that Britain must grasp the opportunity of using advanced automation to improve both qual-

ity and productivity. The need for government help in developing robots and in installing them is considerable."

Mills asked the Information Technology Minister, Kenneth Baker, in the Commons, what action the government was taking. Baker said his department pro-

vided support for research, use and manufacture of robots. Government support was now running at about £1.3 million a year.

"In addition, the Science Research Council looks ahead to the next generation of robots with its industrial partnerships programme," Baker said.

Micro is designed for word processing

by Eileen Stahler

A Z80-BASED microcomputer built around the S100 bus is available from Scottish computer company Atracom. Called the Mikro 1000, it is specifically designed to simplify word processing and has a starting price of £3,500.

Housed in a single desk-top module with an external printer, the system consists of 64K of RAM, serial and parallel I/O, a 12-inch video display and a detachable 117-key keyboard. Online storage includes two megabytes on twin 8-inch disc drives.

Mikro 1000 runs the standard CPM 2.2 operating system which also controls the software designed keys on the keyboard. Over 40 keys have been programmed to match the command structure of the Wordstar word processing package.

Inmos aims to win most of fast 16K static RAM market

by Frank Ogden

AFTER last month's ISSCC presentation in New York, Inmos has started to look like the formidable VLSI house which it promised all along to be.

With the provisional specification for the Inmos 64K dynamic RAM showing a real touch of class, the company now states that it can deliver its high performance but expensive 16K static part with 45 nanoseconds access time. Also there is a promise that device scaling from the relatively conservative 2.7 micron features will produce good parts running at 35 nanoseconds maximum access time. This would take the Inmos 16K static device into the speed range of current BCL (emitter-coupled logic) technology, but without the power penalty.

With the introduction of the IMS1400-45, the company has dropped the price on its standard 55 nanosecond part from \$165 to \$103 in 100-of quantities. According to marketing director Douglas Rankin, a further iteration of the basic 16K static design will lead to a 4K x 8-bit word organised memory appearing by the third quarter of this year.

Rankin, based at the Inmos Cheyenne Mountain, Colorado Springs headquarters, estimated that the "fast" 16K static memory market was currently worth about \$35 million and that his own company aimed to capture nearly all of it.

"Inmos is currently sampling more than 50 customers with the 16K IMS1400," he said.

As yet the only other company to threaten seriously Inmos' chances in this particular segment of the memory market is Intel with its 2167 16K static RAM. It says

that it can deliver volume quantities of the 55 nanosecond device within 12 weeks of ordering but at a price more than \$30 below Inmos.

Inmos is quick to point out that the step and repeat processing used on the IMS1400 should enable better yields and better development prospects than Intel's two micron scaled HMOS recently being run on conventional projection printers. Inmos claims that, while performance boosting of its process has only just begun, Intel is more or less at the end of the line.

John Heighley, Inmos memory boss, claims that both Intel and Texas Instruments have recognised that step and repeat processing is the right way to go, and that these two companies are rushing to build new front end wafer fabrication plants based on this technology.

Heighley is also looking for a lead in the 64K dynamic RAM market based on technical competence rather than price. His company is to market the 64K x 1 IMS2600, with volume delivery scheduled for the end of this year, on the basis of a new architecture. To the outside world it looks like standard 64K part to JEDEC pin-out, with no function on pin one.

By ingenious design wrinkles the basic 100 nanosecond part can be made to look like a 16K x 1 memory with a high speed serial output. Memory contents in the four array quadrants can be delivered successively simply by toggling the -CAS line at up to 25MHz. Thus two banks of IMS2600 devices can maintain a continuous interleaved data stream of 25Mbits/sec, an equivalent access time of 40 nanoseconds.

NEWS BRIEF

CFM shows the way

COMPUTER maintenance company CFM, the wholly owned subsidiary of IAL, has turned in a healthy £400,000 profit on turnover of £4.75 million for 1980. CFM has 20 regional centres, has expanded rapidly and now claims to be the biggest maintenance UK company.

Derek Royle, chairman and founder of CFM, has retired and his successor is Jack Gentle from the directorship of IAL's product and services division.

ICL success

A MAJOR ICL customer, supermarket group J. Sainsbury has installed a dual 2976 system worth more than £2 million to replace a 2970 installed in 1978 and increase significantly its data processing power. ICL says that the 2976 was delivered within six weeks of the initial order and the configuration includes 12 megabytes of main memory with 20 EDS 200 disc drives.

Selling Solve

"VERY substantial growth" in sales of Systemsolve's Solve applications packages range is behind a £1 million turnover growth for the year to last September, according to managing director John Stanley who has announced income of £2.45 million, and record profits for the Sunbury and Manchester-based systems, software and bureau company. The Solve products include Persolve and Ledgerwise. Some 20 per cent of Systemsolve's earnings come from overseas.

Prudent move

MOHAWK Data Sciences made savings of about \$8 million through lower interest rates in January after a stock offering made to reduce bank debt, says chairman Ralph O'Brien, who added: "Some of our order rate in our European subsidiaries during the summer and through October." US computer and communications systems company Mohawk has reported \$5 million profits for the third quarter bringing the nine-month total to \$13.4 million.

Tandy micros to help blind OU students

by Rory Johnston

BLIND students at the Open University should find their work made easier as the result of a research project now being started using voice synthesisers attached to Tandy microcomputers. If the scheme is a success, all 200 of the OU's blind students will have a micro at home which will provide teaching material on a wide range of courses, and even help to deal with the university's administrative paperwork.

Tandy's standard voice synthesiser is being used on three test machines now to see how

programs can be converted easily to produce spoken output instead of printout. The blind students have to learn to input with a standard Qwerty keyboard, and a machine function to help him speak the name of each key as it is depressed.

Eventually it should be possible to use communications links to the Tandy's can act as terminals to the OU's DEC 20 mainframe.

One program already working helps students fill the university registration form, eliciting their choices of courses and warning about conflicts.

Software support plan

by Claire Gooding

SPOTLIGHTING the vendor as the key to keeping the microcomputer marketplace in step with users' needs, Digital Research, originator of the CPM operating system, has developed its Independent Software Vendor Support Plan.

The ISV plan includes seminars, technical support, licensing and software protection information, newsletters, manuals, magazine articles, and a referral catalogue for customers interested in CPM compatible products.

'Market will double by 1985'

HOT on the heels of James Martin's latest publication on programmer productivity: New tools and emerging markets, analysts the options open to users wishing to use programming resources more efficiently and look at the vendor's side of the business as well.

The 140-page report, called Programmer Productivity: New tools and emerging markets, analyses the options open to users wishing to use programming resources more efficiently and look at the vendor's side of the business as well. It costs \$1,500.

Indian threat to the UK's lead in software expertise

THE UK's pre-eminence in world software could be seriously undermined by competition from India within five years, MPs were told at the latest meeting of the Parliamentary Information Technology Committee.

Speakers from the floor, mainly representatives of UK software houses, pointed out that India possessed most of the advantages that Britain had in this field, such as high literacy rates, plenty of graduates, and the use of English.

All that had to happen, it was suggested, was for the Indian government to clear away the bureaucracy that was currently

holding back developments, particularly problems with accessing networks and online databases overseas. The Indian PTT's efficiency is low, and this needs to be rectified.

Some companies, such as Leeds mini-maker Systime, already have programming operations in India.

The Parliamentary Information Technology Committee was discussing government software procurement, with speakers from the software industry, the unions, and the Civil Service.

Barney Gibbens, of CAP, suggested that since hardware was becoming a smaller part of any

contract, software houses should become the prime contractors.

This raised the picture of IBM as a sub-contractor to, say, Scicon, and led one member of the audience to counter with the view that standard packages would again make software a minor part of the cost of a system.

Bob Graham, of the Department of Industry, described the difficulty of quantifying the benefits of computer systems and suggested that a not uncommon productivity improvement of only 10% to 15% meant that taxpayers' money was being wasted on civil servants' toys.

Roy Grantham, general secretary of the white collar union Apex, stressed the importance of software and the need for training, but avoided the vital issue of the attitude of the civil servants' unions to software houses. This delicate question of whether outside contractors should be used in place of Civil Service programmers was skirted around at the meeting.

The UK could have future as an offshore software house for Japan, some people thought, but then Japan would start producing its own software and all Britain would be left with was the job of writing manuals.

GIBBENS: "Software houses should become prime contractors."

12 megabytes of store potential on Apple

by Keith Jones

In theory up to 12 megabytes of floppy disc storage can be interfaced with an Apple microcomputer using the 8000 series disc subsystem developed by Eicon Research of Cambridge. In practice Eicon plans to promote a two-megabyte version which is considered big enough for running the database packages now available for Apple users.

Apple dealer Eicon is sufficiently confident about the reception for its 8000 system among other Apple dealers and Apple users, that it has placed a £200,000 OBM order with Teleprinter Equipment of Tring for double-sided, double density floppy disc drives built in the US by Decitek of Westboro, Massachusetts. Teleprinter is the Decitek distributor in the UK.

Up to four of the one-megabyte Decitek drives can be supported

by the 8000 series controller which was developed by Eicon itself. The two-megabyte version will cost £1,780 to end users. An extra £1300 is charged to bring the capacity up to four megabytes.

The Apple could support up to three of the Eicon controllers, bringing the capacity up to a maximum of 12 megabytes, although in practice the user would probably find it cheaper to go over to an 8-inch hard disc.

Later this year Eicon plans to bring out a version of the 8000 series compatible with the S100 bus on Intel and Zilog-based microcomputers.

Eicon managing director John Hartley said that Decitek floppy disc drives had been selected by Eicon in favour of other makes because of the quietness and accuracy derived from using a linear motor rather than a stepper motor to move the read/write head.

Top-of-range system doubles throughput

COMPUTER TECHNOLOGY has doubled the maximum transaction processing throughput it can offer customers, with the launch of the 8066, a new top-of-the-range system, added to the company's 8000 series.

The 8066 can support up to 75 local or remote active terminals per processor and up to 2,000 megabytes of disc storage. At the same time it runs CTL's well proven transaction processing monitor, TAD.

The 8066 takes full advantage of the communications technology announced last year by CTL as

ICE, Intelligent Communications Environment. Each 8066 can incorporate up to 64 independent ICE I/O processors, each of which can execute all the protocol software for the lines it controls.

All the software for protocol definition and handling is programmed on the host 8000 series machine in the high level communications oriented language, Class.

Like existing 8000 series machines, the 8066 runs under CTL's Modus operating system and all programs and data can be transferred without any requirement to re-compile.

Vehicle information service

by Chris Youett

A COMPUTERISED vehicle and road information service, based on the Datafreight system set up by British Road Services, has started trials in the West Midlands, the South East and Scotland.

The aim is to fill up empty lorries returning from making deliveries. The service has been set up by the Road Haulage Association and will handle data via video terminals. It is available only to association members.

An association spokesman said that after a trial period the service would be reviewed. If it was a success, the service would be extended to the remainder of the UK. At present users have to be based for the service and pay a fee of £1,000.

French govt aid for micro clubs

by Jack Gee

THE French Post Office's directorate for telecommunications is playing "Godfather" to microcomputer fans who have set up 87 clubs over the past three years.

The clubs, known as "Microtel", are getting government funds and technical help under the scheme to make the public more aware of microcomputer technology and its uses in their daily life.

In contrast with the US, where micro fans own their equipment and meet to exchange ideas and link their programs, the purpose of the French clubs is to share computers which are still beyond the range of most people.

Sales of microcomputers in France rose from 15,000 in 1979 to 30,000 in 1980.

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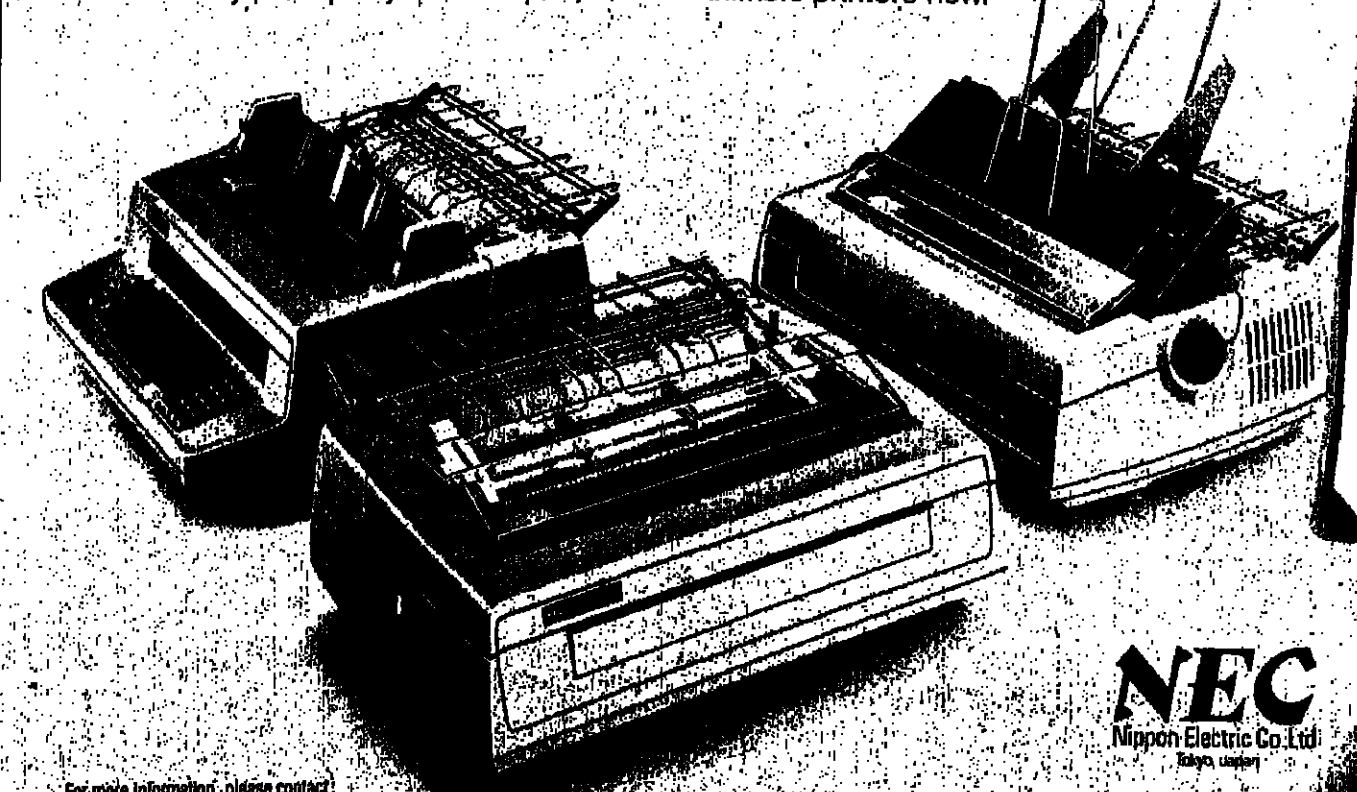


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IBM expected to have 15 times sales of compatible makers in 1980/85 period

by Keith Jones

SALES of \$2.8 billion will be chalked up over the 1980-85 period by manufacturers of IBM compatible processors priced at over \$100,000 according to a report from the US consultancy Creative Strategies. At the same time a report on IBM's corporate strategy over the next few years has been published by another US consultancy, International Resource Development Inc.

The Creative Strategies report predicts total sales of \$46 billion over the five-year period for \$100,000-plus mainframes from IBM and plug compatible manufacturers, meaning that IBM will outsell the PCMs by about 15:1. Of this \$46 billion total, \$21 billion will be accounted for by machines

costing less than \$3 million.

The report underlines that the majority of sales of PCM mainframes are accounted for by AMDahl and National Advanced Systems, the latter having taken over the business of Itel. But there is no discussion of the launch late last year by IBM of the 3081, the first member of the H-series, or of the 580 processor introduced by AMDahl as its answer to the 3081. The AS/9000 from N.A.S. which is based on the Hitachi M200H, is discussed briefly. But there is no mention, understandably, of the M280 announced just a few weeks ago by Hitachi.

The report from International Resource Development looks at IBM's strategies with consumer and communications products as

well as with the H-series. It speculates that it will be at least two more years before IBM's next major announcement following the H-series debut with the 3081.

Online Conferences is holding a conference on March 31 and April 1 called "The User's Guide to the Impact of Series H" at the Royal Lancaster Hotel in London. It is intended to answer questions on why IBM announced a machine with new technology but no architectural changes.

Plug Compatible Mainframes, 145 pages, \$1195. Creative Strategies International, 4340 Stevens Creek Blvd, Suite 275, San Jose, California 95129, USA. Tel: 011-415-249-7550.

IBM (part of) IBD's Directions Intelligence Series 69 pages, \$125. International Resource Development Inc., 30 High Street, Norwalk, Connecticut, 06851, USA. Tel: 0101-203-866-6914.

Magnuson takes off in UK after slow start

DESPITE the highly competitive pricing of the IBM 4300 series, plug compatible supplier Magnuson appears to have got off the ground in the UK after a slow start.

In January alone the company won orders for its M80 series machines from four customers.

They were Sunderland Borough Council, fashion house Jaeger based at Kings Lynn, insurance brokers Stewart Wrightson of Kingston-upon-Thames and EPS Consultants of London.

Stewart Wrightson, which has ordered an M80/31, is already a big user of IBM compatible products

including disc drives from Storage Technology and the Shadow teleprocessing monitor from Altergo. Software house EPS is installing the biggest available Magnuson machine, an M80/42, at its Wimbledon computer centre. The configuration will include three megabytes of main memory.

Hardware attachment makes the Wordcraft package multi-lingual

by Claire Gooding

A MANCHESTER-based firm has come up with a hardware attachment for the Commodore Pet 8000 series which interfaces with the Wordcraft WP package from Dataview to make it multi-lingual.

Cytek is selling the product under the name Multifont.

"We are pushing the Pet up market with these additions," said Cytek director Clive Menhinick.

"It gives a lot of extras which are not commonly available on US word processors such as currency signs, and allows a number of different character sets to be displayed on the screen in conjunction with the usual business character set."

A small switch on the computer allows a user to switch from one character set to another using a daisy wheel printer. "He can set the switch to number two and load

all the data for, say, French clients and produce letters in French with all the correct accents and notation, and then turn the switch to three and deal with German data using the German character set," explained Menhinick.

Cytek is marketing Multifont on four separate fronts at the moment: legal, commercial, scientific and European character sets.

Multifont interfaces with Qume or Wordcraft, and costs £172.

Four suppliers on Bank of Ireland's list

A £4 MILLION contract is being competed for in the Irish Republic, where the Bank of Ireland is to order terminals for its 350 branches throughout the country. A potential suppliers' list of 11

has now been reduced to four: IBM, Nixdorf, Philips and Olivetti.

The Bank of Ireland decision is expected within six weeks, and will mean that the selected com-

pany could look forward to at least a 10-year association.

As well as the supply of terminals, the bank's special assessment team is evaluating proposals for the central system.



Managing director Alan Davies assesses the UK dealer network.

Ohio sets up UK subsidiary

by Donald Kennett

OHIO SCIENTIFIC, maker of the Superboard and Challenger ranges of microcomputers, has launched a wholly-owned subsidiary in the UK, based in Langley, Berks.

Preparations began in November for the establishment of the UK company under managing director Alan Davies and in December the US parent was taken over by communications giant M/A-Com, whose many microwave subsidiaries cover a wide range of activities from satellite and

Davies has welcomed the takeover, which he believes will strengthen the UK division as it tackles a market for microcomputers estimated to be worth £111 million this year.

Engineering support for the larger systems has been arranged with Systems Reliability.

Perkin-Elmer's 32-bit rival to the IBM 4341

by Brandon Gamstner

SUPERMINI manufacturer Perkin-Elmer Data Systems has launched a 32-bit processor said to offer comparable performance to IBM's 4341 Model 1.

By selling the processor with its already established transaction monitor, Reliance, the company hopes to capture a large market with commercial users such as banks and insurance companies, requiring high performance transaction processing.

The 3230, which can be expanded to address up to eight megabytes of main memory, slots into the 3200 Series between the bottom of range 3220 and the higher performance 3240, which can address up to 16 megabytes.

When compared using a variety of benchmark tests with DEC's 32-bit mini, the 3230 is said to pro-

vide 94% of the performance of the VAX 11/780 at a much reduced price. A typical 3240 system would cost about £70,000, says the company.

Although the main market for 32-bit minis has traditionally been for scientific applications, product manager Fred Mascarenhas told Computer Weekly that sales are now much stronger for commercial applications, about 70%-80% of the company's machines going to this sector.

Deliveries of the 3230 will start immediately.

SEL Computers is also stepping up its marketing of 32-bit minis with the three new systems optimum based on its 3277 machine.

In the middle and top of the range an internal processing unit (IPU) leaves the CPU to control I/O and interrupt operations. This results in a very high system throughput, says SEL. The further addition of floating point units enable the CPU and IPU to perform floating point operations at high speed.

All three systems are expandable to 16 megabytes of main memory.

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NEWS BRIEF

Navy buys ICL 2976s

THE Royal Navy is buying the ICL 2976 mainframes and about 200 terminals to replace its existing separate stock control computers with a single unified system operating across the country. The entire project is understood to be costing around £10 million, including £2 million for software.

ME29 success

THE sales success of the ICL ME 29 continues with the announcement that the ICL machine is to replace an IBM System 3 at Alton UK, the agency that runs employee motivation schemes for 20 client companies. The contract is worth £250,000 and includes software modules for award computation based on ICL's Prosper.

16-bit agreement

SIGNETICS, together with its parent, Philips, has signed an alternative source agreement with Motorola covering the 16-bit M68000 microprocessor. The agreement is described as being "aimed at creating the industry's strongest 16-bit product line".

Memory boost

A GENERAL purpose memory system claimed to be the first standard system with built-in intelligence, memory fault tolerance, advanced diagnostics and preventive maintenance features has been announced by Intel. Called the IQX system, it can come with dynamic and static storage intermixed and is added to Intel's Series 90 memory family.

Cut-price

SYSTEMS builders could be interested in a cut-price multiple peripheral offer from CPU Computers of Woking. The total one-off price has been reduced from £4,500 to £2,990 for one 60 cps Centronics matrix printer, two Shugart eight-inch floppy disc drives, one eight-inch Winchester drive with controllers and a CPU Pentland VDU.

Recruitment firm

BEGINNING its trade in March is a new company for the recruiting and appointing of DP staff. Sign Gate, based in Kingston, deals with "the whole gamut of DP professionals" on its appointments register on a flat fee system.

Iran business

HONEYWELL Italia, which covers the Iranian market on behalf of its US parent, has issued a statement saying that any resumption of business there is "subject to the evolution of relationships between Iran and the USA". It was not ready yet to resume business with its Iranian distributor, Isiran.

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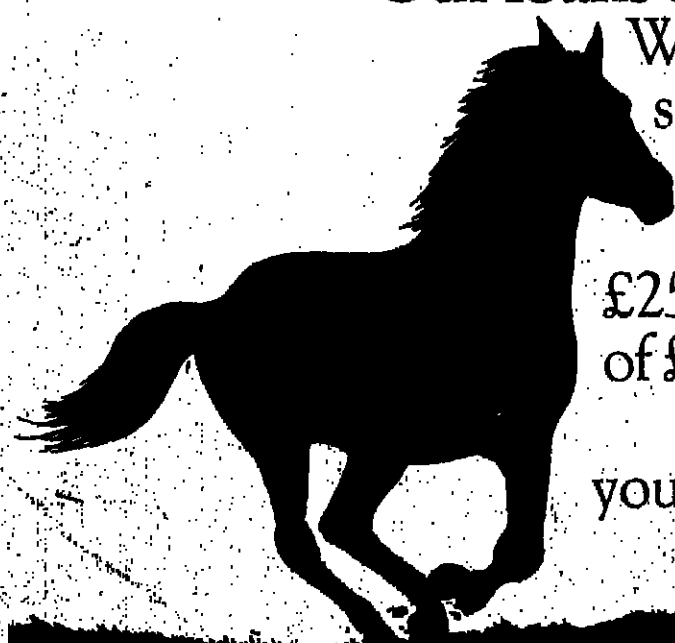
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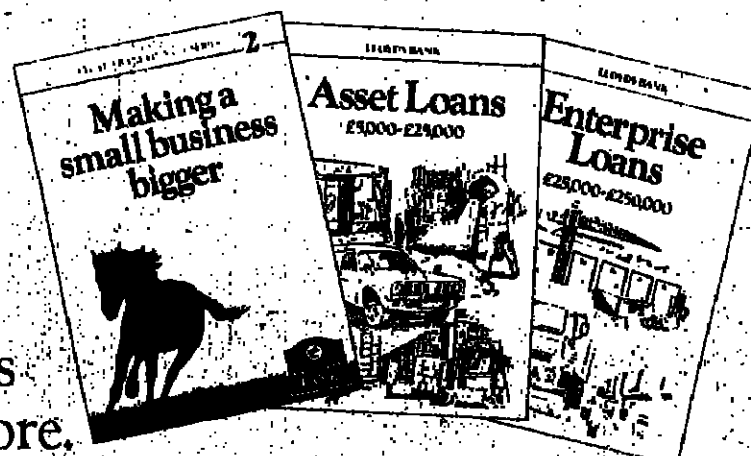
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200 screens will link to joint WP and DP system

by Rory Johnston
A COMBINED word and data processing system complete with its own local area networking system has been launched by Omnidata, the California firm that has designed products for Triumph Adler and is now branching out on its own.

A xerographic printer from U-Bix in Japan is expected to be available as an optional extra by the end of the year.

Up to 200 screens can be attached to Omninet, the 1.5-megabit local network that uses IBM, SDLC protocols to provide access to shared printers and discs with file processors.

A cluster system called Omnishare is also offered, allowing up to five screens to be operated together.

Omnidata founder Paul van Alstyne, who like others of his Omnidata colleagues took part in the founding of Wordplex, predicted that sales of clustered

word processors would overtake those of standalone machines by 1983.

A direct marketing operation for Omnidata is starting up in the UK, and it is planned to open a factory for system assembly in Nigeria.

Omnidata is 46% owned by Triumph Adler (which is ultimately owned by Volkswagen) and the Omnidata team were involved in the design of the Bitsy word processor which TA has been selling for nearly two years worldwide.

The Omni 2 consists of separate screen, keyboard and twin floppy disc units which can nestle together on a desk. Mathematical and sorting functions are provided when in word processor mode, and data processing can be done either in Cobol or Basic. Including a Qume daisy-wheel printer, one Omni 2 sells for £6,250.

The U-Bix printer will also act as a copier and will sell for between £10,000 and £15,000.



Surveying the Omni 2 assembly line in Westlake, California, are two of the firm's founders, Paul van Alstyne and George Greenspan, who have switched from designing word processors for other people to working for themselves.

Dealers attack CAP

by Kevin Cahill
MAJOR criticisms of UK software giant CAP were voiced at a meeting of Sord dealers.

The meeting, in Beaconsfield, was attended by 14 dealers from over the UK, and the Penzance-based Sord distributor, Exleigh Business Systems.

Dealers at the meeting, called to launch the Sord master baker PIPS data handling software, complained about having to buy demonstration software from CAP, unfriendly prompts and difficult manuals.

Don Martin, a director of Exleigh Business Systems, described the meeting as stormy. He felt, however, that he had been able to calm some of the dealer fears by pointing out that extensive research in the UK and abroad had failed to produce a better set of packages than CAP's.

A spokesman for CAP said they were sorry to hear of the criticism and hoped that the new CAP structure would make support to the dealers easier and better.

SOFTWARE FILE

Basic aim to beat the program pirates

TWO Basic products for use on the Commodore Pet have been released by a Dorset-based company to try and combat not only Basic's limitations in speed and performance, but also the illicit copying of programs written in the language.

DTL-Basic is the name of Drive Technology's compiler, which is said to reduce the run-times usually associated with the use of an interpreter, and also, since compiled programs are more compact, use less of the precious 32K-bytes of RAM on the Pet.

While DTL-Basic is aimed at hobbyists and educational users who do not intend to sell programs, a more sophisticated version of the same product is available for those concerned with protecting their software development, called DTL-P-Basic.

Both products are said to be fully compatible with the Commodore-Interpreter, so that existing programs can be re-compiled to run 10 to 20 times faster. It also converts integers to real numbers for speed and accepts extensions to Basic implemented in assembly language on RAM or ROM.

The idea behind the protected version of DTL-Basic is to stop illicit copying and piracy by putting user-copies on protected discs, formatted by DTL so that they cannot be copied or duplicated.

DTL estimates that for every copy of a program sold, two or three copies are illicitly made.

The method of protection is closely tied to Commodore disc technology. "We use a special utility in the disc drive RAMS which formats the disc so that certain tracks will give errors if they're read" explained David Hughes of Drive Technology. "In fact they do contain information and programs won't run without it. Every time you run a compiled program on the protected version, it looks for that information, and if it's not there it corrupts itself and dies. This protects the whole disc



ON the assumption that engineers need friendly computers, the Royal Aeronautical Society's Engineering Sciences Data Unit has produced two "user friendly" graphics packages aimed at cutting out much repetitive and time-consuming calculation in design areas such as structural engineering, material fatigue and fluid mechanics. The packages, called COM-pacs, allow engineers with no special training in computing or programming to perform calculations and see immediate results on the screen, using Tektronix 4051 graphics computers, as pictured here.

Package designed for first-time user

EXLEIGH Business Systems has announced two new packages to run on the Sord range of microcomputers which Exleigh distributes in the UK.

PITPS is a text and file handling package which is said to allow the first-time user to create, sort, judge, and analyse data without programming knowledge. The second package, as yet unnamed, is a specially tailored general accounts package for the Master Bakers Association.

Ada's place in 'Tower of Babel'

DR KNUT RIPKEN, who leads the team developing the front-end Ada compiler, is to present a seminar on Ada, designed to inform marketing and software professionals of the latest developments in the language.

The seminar is to be held in London on April 23/24, sponsored by the Education Foundation of the US Data Processing Management Association and the UK IDPM. It is to focus on Ada's place in the programmer's "Tower of Babel", its main features and programming environment, as well as specific areas of writing and designing for the language.

Those interested in attending should contact H. Flournoy at State of the Art Ltd, on 01-242 4045.

IN last week's report on the Gower software protection conference reference was made to a software package called Locksmith. This is marketed by Software Products Inc, not by Semble Software as we reported, which makes a similar product known as Back-it-up.

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ADP subsidiary to specialise in hotel computers

by Keith Jones
SEEING great potential in the hotel business for computer systems sales, ADP Network Services has set up a separate subsidiary company: ADP Hotel Services, to concentrate entirely on a market estimated to be worth about £100 million a year.

The main offering from ADP Hotel Services is a system based on the Rair Black Box multi-screen microcomputer. It comes with software development by ADP for handling jobs like local reservations, room management, food and beverage stock control, function booking, personnel records, and accounting operations such as ledger updating and profit and loss reports.

Hotel groups will be able to use their Black Box terminals to link into the ADP network for accounts control and central reservation processing, and all users will dump files on to the network for backup.

The concept of a local system operating in conjunction with its network facilities is not new to ADP. For several years the company has been promoting its On-site service where most of the workload of a big customer is run on a dedicated Digital Equipment DECsystem 2010 while ADP's DECsystem 10-based worldwide network service remains available.

For this reason ADP has seen fit to use a play on words, ADP insite, to describe its new hotel service. It was developed entirely in the UK but ADP expects to promote it in overseas markets.

ADP says that it selected the UK Black Box microcomputer for reasons like its multi-terminal configuration - there are at least two screens on each machine - the availability of a five-megabyte hard disc drive, easy access to the original supplier and the popular CPM operating system which provides the possibility of software portability if an alternative machine model is ever needed.

To strengthen its credibility in the hotel business ADP has hired Alan Coby as ADP Hotel Services managing director. He has 12 years' experience in the hotel industry where he has developed systems for applications like management information, financial accounting and reporting. Coby referred to a survey carried out early last year in conjunction with the British Association of Hotel Accountants which revealed that nearly 90% of the 60 hotel groups reviewed used some form of computer facility but felt that there was a need for suppliers to specialise in hotel applications.

ADP's batch and network services are already used by 50 hotels in the UK and the US.

Fastest datacomms growth in information retrieval

by Donald Kenneth
INFORMATION retrieval and person-to-person communication are likely to be the fastest-growing applications of data communications in Europe during the 1980s while point-of-sale is unlikely to take off until the 1990s, because such a high degree of co-operation and co-ordination is required between banks and other users.

This is reported by Robert Jack, a member of the Logistics team which carried out the Euradata 79 study for the European ETAs. His paper on user applications was one of those presented by the study team as a seminar organised by Online.

Whether or not datacomms is identified as being of major importance, and attractive to a wide range of business users.

Viewdata terminal numbers in Europe were expected to reach 2.7 million by 1987, the end of the period covered by the study, while all other types totalled four million. But 1987 was expected to be the start of a period of extremely rapid growth, after the numbers had taken until mid-1985 to reach one million, and late 1986 to reach two million.

Wideband transmission equipment had formed a small and falling proportion of all data terminals between 1973 and 1979, according to a paper by Tim Johnson, who managed the study, but this was likely to change during the 1980s.



Roy Atherton teaches Comal on a Piccolo microcomputer.

'Comal easier to learn for beginners'

by Nicholas Benwell
OVER the last five years or so, the Danes have caused quite a stir with their new language called Comal (Common algorithmic language).

A structured version of Basic, its full name is Comal 80 and it preserves Basic's didactic qualities.

Roy Atherton, the UK Comal guru, organised a conference at Bulmer College where he explained to some 80 teachers, and others, the advantages that they would gain for their students by switching to Comal.

Comal was said to be easier for beginners to learn than Basic because it tackles problems like number doubling in a way which relates more closely to a human approach. The resulting programs were likely to be shorter than when written in a computing language

Controlling food and drink

by Chris Yonett
WHAT is thought to be the first system for food and beverage stock control was launched by the Hotel System's Division of Monotype Communications, at the Catering Equipment, Food and Services Exhibition. It costs between £9,500 and £40,000.

A Monotype spokesman said previous attempts to provide this service had failed because would-be users and systems houses had tried to bend US software to fit a UK environment.

Monotype commissioned Multiple Systems Ltd to write the software to its own specification.

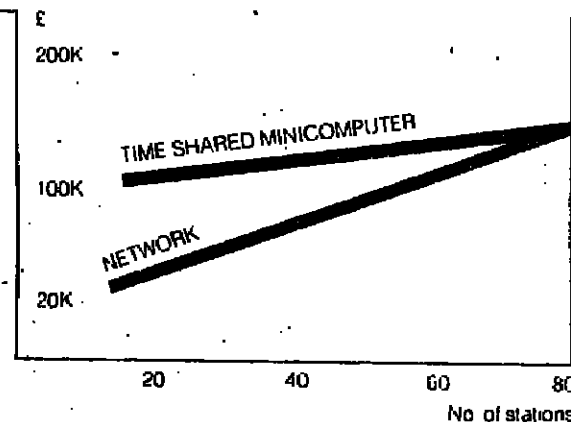
The system is menu driven and is designed for use in hotels, colleges, industrial caterers and banqueting firms. It has three main functions: maintenance and reporting, recipe costing and working out menus.

The system can be used for up to eight sales outlets and can handle up to eight pricing structures.

The software is written in a Cobol-like language but conversion packs for Pascal, Basic, Fortran and Assembler are also available.

The spokesman said Monotype's word processing software was also supplied free with every system.

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MSA aims to be a major force in office of the future

THE announcement that US software products house Management Science America was going public, has focused attention on a firm with a colourful history and on its even more colourful chairman, John Imlay.

Based on the unspectacular field of financial and accounting packages, the company has turned, under Imlay's leadership, from a long and tortuous bankruptcy in the early Seventies to a turnover today of \$50 million, and is aiming to become a major force in the office of the future.

Up to now MSA has stuck fairly closely to its original product line of applications packages for financial reporting, ledgers, and payroll. Customers are offered standard options to fit their systems to the varying laws of different states, and are saved the considerable expense of program maintenance by the updates issued by MSA whenever, for instance, tax laws change.

There's no difference between what we are doing and developing a record for a record player.

Now, however, Imlay is charting a new course for the company based on his own vision of the software house as the only sensible source for a design for the automated office.

"Somebody has to tie the systems together," he says, adding that it will not be the companies already in the field. "They all have a hardware mentality," he asserts.

To this end, part of the proceeds of the sale of 11.2 million shares will go towards acquiring small companies to provide MSA with

expertise it does not already have. Out of this is intended to come a system design for the office of the future that the customer will be able to run on whatever hardware he wants. "I don't care about the hardware as long as it has the capabilities needed," Imlay says.

Here he is flying in the face of all the opinion that says that office systems running on general purpose hardware tend to be difficult to use and unsuited to the office environment and office workers.

He asserts adamantly, "There's no difference between what we are doing and developing a record for a record player."

Firms such as Exxon, Imlay says, are going to be selling a hardware product even though they claim to be selling a system. In contrast, he suggests, "the fellow who designs a system with real value added," and this he intends to do, to run on practically anyone's kit.

He adds with a smile, "I want to be nice to Exxon."

Developments in communications are especially significant for Imlay's office of the future thinking. With satellites and cheap earth stations providing almost unlimited bandwidth, electronic mail and teleconferencing will become easily available and convenient, and so must be a central part of the system design. Teleconferencing, incidentally, is something Imlay is already enthusiastically using at MSA to link the offices that are scattered around the country.

"It provides lots of empathy," he says.

Looking at MSA's traditional product line, Imlay says, "Business prospects are stronger than ever." The recession is causing some difficulty in getting orders actually signed, but on the whole, financial stringencies lead to more demand for his money-saving pro-

ducts, not less, Imlay believes. "The market is expanding faster than we can," he says.

The introduction of the IBM 4300 range has given MSA 200,000 new prospects, Imlay estimates, and with current penetration of the market less than 5%, the company is aiming to grow to 15,000 customers in the not too distant future.

A UK office has been opened, and expansion is also under way into Australia, Canada, and Belgium.

UK financial reporting and ledger requirements are similar to those in the US, so MSA's software for those areas can be used here without much change, but payroll systems are totally different. For that reason MSA bought QPAC and its existing products, giving Imlay a complete range here.

He does not see himself as competing against UK software houses, but rather with their US equivalents and multinationals such as IBM and RTZ.

He sees little threat from microcomputers, regarding them as being in a different league from the nine mainframes his products will currently run on. There are plans to develop versions for the Hewlett Packard 3000, but Apples and Pests do not enter his thinking.

Where Imlay does see the spectre of competition is from Japan. Software is Japan's Achilles

heel at the moment, Imlay says. "But in two years they will realize they need software and then..."

With government loans and tax concessions, and their traditional high productivity, the Japanese will be a major competitor by 1985.

As Imlay sees it, "And I don't relish the thought."

Imlay's involvement with MSA has been eventful, to say the least. Having been a salesman with Univac and Honeywell, he first came to the seven-year-old MSA in 1968, to sort out the problems caused by an over-rapid expansion. Over the next three years the firm went through a tortuous bankruptcy and Imlay was sacked twice.

Eventually he was reinstated at the insistence of creditors, he repaid all the major secured debts, and since 1972 the firm's turnover has grown from \$2.7 million to \$50 million without getting out of control.

The success of the rescue gave Imlay a chance to look outside at broader issues, and for 1979 he was president of ADAPSO, the US computing services association, the first to come from a software products house.

The issues of software copyright and unfair competition from the banks and accountants preoccupied him there. His efforts on copyright are finally coming to fruition, with a Bill currently before the House of Representatives, and a lawsuit still going on against Citicorp.

Asked what he is especially proud of from his time at ADAPSO, Imlay replies, "We opened up a dialogue with IBM. This included negotiations over software protection and the release of specifications of new products. The latter was largely successful. Imlay feels, and he also managed to get IBM to break up software packages so that the separate parts were small enough for his members to compete against."

He sums up, "We have to live with IBM so we need to talk to them."

Imlay's reputation for dramatic gestures and colourful, outrageous speaking continues unabated. Whether his daring claims over the office of the future will be vindicated or not the computing community is waiting eagerly to see.

The fellow who designs a system without the hardware will be giving the real value added.



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MICRO NEWS

Donald Kennett selects three areas of interest from last week's Microsystems 81 conference and exhibition

More work is needed in the upper levels of ISO model

WORK on the upper levels of the ISO layered networking architecture will involve a good deal of thrashing about for some time to come, according to Charlie Bass, co-founder of US local networking company Ungermaier-Bass.

In his keynote speech at the Microsystems 81 conference last week, Bass told delegates that bringing together the methods used in many different applications and by many different system suppliers would be quite a feat.

However, it was increasingly recognised that the upper level functions - application, presentation and session control - could be worked out independently of the lower level ones and could remain consistent across different types of lower levels.

"Local networks concentrate on the lower levels," he said. "Ethernet only talks about levels

two and three and chips to do the bus was preferred by his organisation for its lack of central controller and its use of passive taps.

He predicted that in the 1980s local networking would converge with long-haul networking into something called integrated processing, where an individual at a terminal could access local or remote facilities with no apparent difference.

X25 was being used in local networks simply because the parties wishing to communicate locally had already implemented it for long-haul communication.

He drew attention to the differences between broadband and baseband transmission. Broadband, in which transmitted data was modulated on to a high frequency carrier, was very attractive to implementers of systems in which video, voice and data traffic were to be handled separately but

on the same cable. Coaxial cable was used extensively in the cable television industry and it provided a bandwidth of up to 300MHz, capable of carrying about 150Mbps of data. Broadband techniques were ripe for leadership towards open networking standards, but the many companies active in the field, including Wang and IBM, were probably more interested in market leadership than standards leadership, he thought.

Baseband systems, such as Ethernet, had been criticised for being unable to carry video traffic, but they saved on expensive broadband modems, since they put digital signals directly on to the cable. The lack of a modem gave rise to a trade-off between speed and range - 1,500 feet at 10Mbps or 4,000 feet at 4Mbps, as against up to 25 miles for broadband.

A large organisation with a hierarchy of computing facilities from mainframes to personal computers would probably have a hierarchical network, which was different from the star topology used by PABXs.

The UK was the centre of the universe for rings, he added, while

another request from users through their dealers was for Zilog to back the maintenance process, so another part of the new turnkey package is a maintenance contract with Zilog. Zilog had previously referred customers to Mills Associates for maintenance. It will now contract with third party maintenance companies itself, to service its contracts with users until it builds up its own field engineering team.

The accounting software is licensed from Holland Automation International in Holland, under a royalty agreement and was chosen after several packages were evaluated by accountants. It is an established system and has the added advantage of being available in French, German, Italian, Spanish and other natural languages. Should demand justify, it will be adapted to run under RIO and CPM, the operating systems already available on Zilog systems.

Similar moves are being made by Zilog in the US, but there it is using Cobol programs instead of Basic.

The turnkey system with an Anadex 9502 matrix printer costs £4,830 and with an NEC Spinwriter petal printer £5,535. The Wordstar word processing software from Micropro is an option and versions run either under RIO or under CPM.

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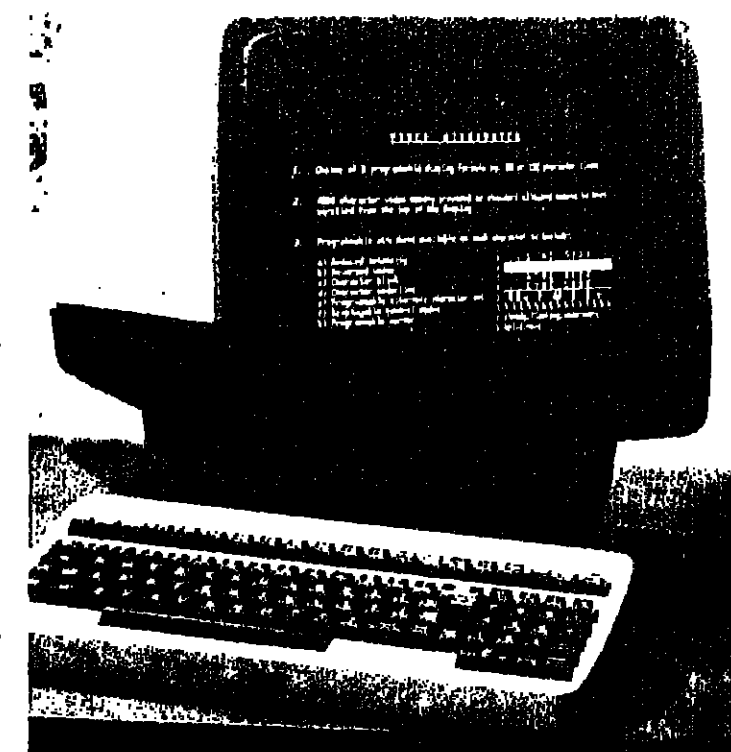
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Power supply maker Gresham Lion of Feltham, Middx, has diversified into terminals following a deal with James Scott Electronic Developments for the manufacturing and marketing rights to the Lyme 5000 132-column 6809-based VDU.

Zilog turnkey package for systems market

IN an effort to boost its systems sales, micro maker Zilog used Microsystems 81 as the platform to launch a turnkey package based on its established MCZ-1 microcomputer, but now offered with an accounting package which runs under a Commercial Basic with a built-in operating system, as well as a printer and a VDU.

Systems already account for 30% of Zilog's \$50 million (last year) worldwide sales, and in Europe the proportion is 60%, but these have always been sold to firms which were primarily customers for components. Systems division's head of European marketing Dr Pamela Geisler said last week it was a bit of a mystery how so many systems had been sold when awareness of Zilog as a systems company was so low.

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Swedish redesign ABC-80

SWEDISH design house Data Industrie has re-engineered its ABC-80 280-based microcomputer. The new version, called the ABC-800, is to be produced at the rate of 50 a day from mid-April by Swedish electronics manufacturer Luxor, which also makes the ABC-80. It will be sold in the UK by Microtech of Knutsford, Cheshire.

Data Industrie has also sold a licence for the ABC-800 to an unnamed "large US company with interests in the field" and which is said to have 100 programmers writing applications programs for it now. The deal is to be announced officially at the Hannover Fair.

Additional hardware for the system includes a video driver board containing up to 18K bytes of RAM and capable of controlling a bright-colour graphics display with a resolution of 240 by 240 picture points.

The basic box also has an input and is now compatible with the ANSI standard. It has 16 digit floating point arithmetic, variable names up to 32 characters long, and colour graphics handling instructions such as Vector and Paint.

Data Industrie also showed a colour graphics system called Datacolour, which has a resolution of up to 640 by 512 picture points and is capable of being connected to an external computer via a V24 interface or operating as a stand-alone unit. Prices start at about £4,000 plus the colour monitor and input aids such as a digitiser pad and software.

No connection

On March 5, Micro News reported on a high resolution graphics package for the Apple II, which is available from Systemics Ltd, 3 Hillberry Court, Bushey, Herts. The company has no connection with Systemics Ltd, which is part of the Systemics International Group, and is based in Basingstoke, Essex.

Setting up your own company - 3

How to finance an expanding enterprise

IN this third article on the care and financial maintenance of small computer companies, we look at some of the problems which are likely to face the entrepreneur as he or she moves from a one-man operation to larger things.

So far we have assumed that the operation is a one-man/woman company, maybe selling a contract service, or a consultancy. Because there is such a substantial difference between pure trading companies and a software or hardware manufacturer, we will assume for the remainder of this series that the company, like a lot of small computer companies, does a bit of manufacturing and selling.

The first thing to consider is the cash flow. Is there going to be enough money coming in fast enough to pay the bills as they fall due?

The key bill, as the company moves from sole proprietor, is wages. The salaries must be paid each month, whatever happens.

This, then, is the moment to look at the various start-up and equity-related loans available.

Basically, equity is an investment in a company, not a loan, and is usually recorded in the form of shares given to the investor.

The advantages of equity are that, unlike a loan, it is not basically repayable, and the interest is determinable by the company itself, in the form of dividends. The investor logically hopes to make an income from his investment and perhaps capital gains by selling his or her shares later. But the main advantage from a small company's point of view is that there is no burden of capital repayment.

Assuming that you are a small software house, writing software for the hardware you buy from an OEM manufacturer, and selling the results as a package, you are going to face two problems: You will have to pay your supplier, maybe long before you are paid yourself. And you are going to have to pay yourself and your programmers while you write test and implement the software.

If you consider your approach or your software unique, you may be able to get extended credit from your supplier. But beware - this road to ruin is paved with the corpses of small outfits which had the credit strings from a supplier drawn tighter than originally promised.

At this point you should consider the kind of capital needed to get you into a reasonably comfortable trading position. As a rule of thumb, look for equity capital to cover one year's trading. The Barclays start-up loan mentioned in last week's table should help most mixed software hardware companies off the ground.

But suppose you have a project which will take more than a year to

get into production and into the marketplace. What then? Or, if you have been expanding while that your initial capital is no longer covering your gap between start-up and payments?

On the left is a table which shows the various stages of growing a company. You should be able to match the growth of your operation against the table and see in what way you should be looking for finance at any given moment.

When you have outgrown a small start-up loans and need equity funding, you will begin to think of specialised financing. There are many schemes and which offer equity rather than loans, or a mixed package of both. The NRDC offers such packages so do many merchant banks.

If you are to apply for the packages the first thing you will need is a business plan, the one being to demonstrate to your potential backers who and what your company are.

In America business plans run to volumes, but traditionally here in the UK they run from 10 to 25 pages.

The business plan should show, at the very beginning, the pedigree of the team which is to run the company. This can be in the form of a CV of each of the key members of the team.

Then you should set out in technical language a description of your company and its key products.

This is usefully followed by an analysis of the markets in which you intend to sell your products, and your plan for organising the sales drive.

Naturally you need a cash flow and any other details of your financing needs.

After that you should put in any other relevant material such as predictions of market growth in the area you intend to operate, and details of your suppliers and contacts.

When you have finished the business plan take a long hard look at it and ask yourself: would you put into it the kind of money you are expecting others to?

● In the next article in the series we will look at sources of equity finance, bearing in mind the changes made for investors in the Budget.

CORRECTION: Last week's article on financing for the small computer company went to press before the Budget and included information which has since been revised. Contact the relevant banks for details. An error showed that the business development loan is not from amounts of £2,000 to £10,000. The latter figure should have been £100,000. Apologies.

Leasing boom

UNITED LEASING, the London leasing company specialising in IBM leases, has reported sharply improved profit and sales for 1980. Profit was £502,000, over £100,000 up on 1979. If the special item of £350,000, realised from the sale of interests in a management company, is taken into account, group profit for the year is £1,022,000.

Turnover rose to £9,600,000 from £5,000,000 in 1979.

Turnover up £2m

TURNOVER at Kodak International, the Wiltshire-based national manufacturing and marketing company, rose by nearly £2 million in 1980. Turnover was £10,425,000, against £8,500,000 in 1979.

Pre-tax profit rose to £1,400,000 for 1980, from £1,253,000 in 1979. This was short of expectations which had led the market to anticipate profit in the region of £1,800,000.

W Europe market to outstrip US by 1991

THE compound annual growth rate for the world electronics market, including computers, will be 8.5% through to 1991 according to Dr Ian Mackintosh.

Speaking to delegates at a Semicon/Europe meeting in Zurich recently Mackintosh said that the total electronics market would be worth \$850 billion by 1991, three times what he estimated the worldwide car market to be by then.

By that year the biggest single market will be Western Europe, with annual expenditure of \$244 billion, followed closely by the US with \$211 billion. Japan will be spending \$95 billion by then.

The relative trade balance in electronics by the year 1991 will have Japan in surplus to the tune of \$40 billion and Western Europe in deficit by \$12 billion, he said.



Ulf Gustavsen, managing director of Norsk Data UK, will push software development for the Norwegian company in Britain.

NEB makes big profit offloading ATS shares

THE National Enterprise Board has made another four-figure percentage profit on the sale of its stake in a high technology company.

It has sold 75,000 shares in Automation and Technical Services (Holdings) for £806,250 at a profit of 1,512%. The NEB took £100,000 of preference shares in April 1978, which have now been redeemed at par (their face value) and £30,000 of equity, representing a 30% stake in the company. These are the shares which have made the profit.

Another 14 shareholders have also sold a further 20% of the equity at the same price - £10.75 per share, says the company.

Buyers of the shares are two

groups seeking investments in high technology companies, Innotech Investments and investment trusts managed by Murray Johnstone. Innotech now has a 33% stake in ATS, while Murray Johnstone's clients, Laurence, Proust & Co and ATS employees, have raised their stakes from 18% to 29%.

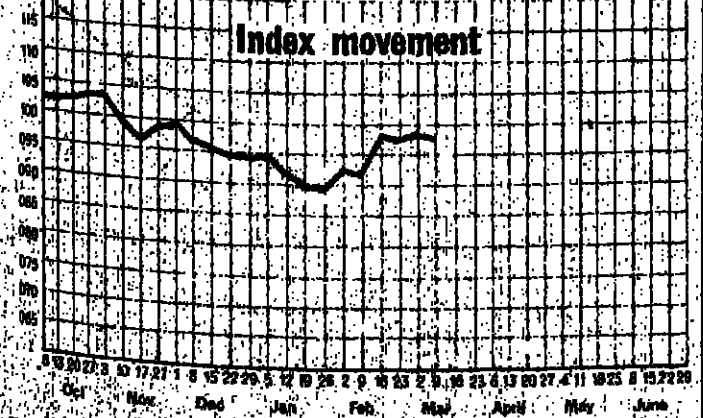
ATS (Holdings) is the parent company of ATS Communications and ATS Telemetry, formed in 1969 and now based in Haywards Heath. The two make a range of telegraphic communications systems including Vitol telegraph-compatible VDUs, telex auto dial and message distribution systems, and telemetry remote process control equipment.

CW SHARES TABLE

Date: 12/3/81		Index: 92.68 Change: -6.80		US Stocks	
Price	Change	Price	Change	Price	Change
100	100	100	100	100	100
101	101	101	101	101	101
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104	104	104	104	104	104
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197	197	197	197	197	197
198	198	198	198	198	198
199	199	199	199	199	199
200	200	200	200	200	200

The table shows the closing prices in America on Thursday and the mid-day prices on Friday for London. The share index is based on the prices of the UK companies in the table. Highs and Lows have been adjusted where necessary.

Shares traded under the Unlisted Securities Market or under Rule 163(2)(a).



Fast-growing Norsk sees UK as prime site for software development

NORWEGIAN computer company Norsk Data has revealed a doubling of profits for 1980, to just over £2.5 million from just over £1 million in 1979. Turnover for Norsk rose by £8 million to £25 million in 1980. The shares stood at just over 400 Kroner on the Norwegian stock exchange last week, up from 110 Kroner late last year (£33.40 against £9.90).

The figures, which were revealed at the opening of Norsk Data's new UK headquarters in Newbury, have led City money men to speculate that the company may raise funds in the UK. Certain institutions are understood already to have holdings in the parent company in Norway.

Ulf Gustavsen, managing director of Norsk UK, refused to respond to questions about the possibility of UK financing for the company. Chairman of the Norwe-

gian parent company Asmund Slogendal said that he would not rule it out but that there were no immediate plans for either a listing on the UK Stock Exchange or for raising private equity.

Norsk Data has just moved its UK office from London to Newbury and announced plans for a range of developments which could provide 20 to 40 more jobs in the area.

The company claims an annual growth rate, in terms of staff and sales, of 40% per annum for the past 13 years, and sees the UK as a substantial growth market for computers.

Slogendal said the company recognised the problems of the UK recession, but felt that the "customised" approach adopted by Norsk Data had enabled it to expand its customer base, despite the problems of the economy.

The company has recently installed systems at Hull College of Higher Education and at Pitman Press. The latter is an indication of a move out of the almost exclusively scientific and academic area to which it has been confined since opening in the UK with the installation at Exeter University's department of computer science.

The company has just won a £10 to £12 million order for the flight simulators for the American F16 fighter bomber, and the CERN project at Geneva now has over 150 Norsk computers installed.

Slogendal said that plans for the UK were to continue to import machines from the Norwegian parent, but to do all the software and technical development locally. It is very difficult to recruit suitably qualified software people in Norway, he added.



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When a program needs a copyright notice

MANY books, pamphlets, journals, articles and — increasingly — computer programs contain, at or near the beginning of the work, a notice of copyright.

What is the purpose of the notice, and when and where should it be fixed to a computer program? The first point to emphasise is that a copyright notice is not a requirement of UK copyright law and conveys no advantage to the UK owner of a copyright work in this country. The purpose of the notice is to obtain the benefit of copyright protection for published works overseas.

There are two major international copyright treaties, the Berne Convention dating back to 1886 and the Universal Copyright Convention established under the auspices of UNESCO in 1952. The UK is a member of both.

The Berne Convention requires no formalities for the exercise of the rights it confers, whereas the UCC, which offers a lower standard of protection, provides that all formalities are satisfied if from the time of first publication all copies bear the symbol © accompanied by the name of the copyright proprietor and the year of first publication.

A copyright notice is therefore required for works which are published in countries that are members of the UCC but not of the Berne Union. The principal country in this category is the US and in practice the primary reason for affixing a copyright notice is to secure protection there.

Under the 1909 US Copyright Act, failure to include a notice, or a correct one, could seriously affect copyright protection or, as in the Data Cash case, eliminate it altogether. Under the 1976 US Copyright Act (which came into effect on January 1, 1978) an accidental omission is not quite so serious but nonetheless it is still important to include the notice in the right form on all published copies.

The copyright notice consists of three elements: the internationally recognised symbol © which tells the reader that copyright is claimed; the year of first publica-



Bryan Niblett is a barrister and computer scientist specialising in the legal problems associated with computers.

tion; and the name of the copyright owner. So if John Doe owns the whole copyright in a computer program, or in a subroutine, a valid copyright notice would be the line:

©John Doe 1981
as a comment in the first few lines of the source code of the program or the routine.

If the program is a joint work then the notice might take the form:

© John Doe and Richard Roe 1981

Where a computer program consists of a number of separate and independently owned sub-routines (rather like an anthology of poems) a single copyright notice at the beginning of the work giving the name of the owner of the program is sufficient to protect the copyright in the collective work and in the individual routines.

The UCC Convention provides that the copyright notice should be placed "in such manner and location as to give reasonable notice of claim of copyright." Proposed regulations issued by the US Copyright Office give examples of how this may be done for a program in machine-readable form. The notice should be embodied in the object code so that it appears in visually perceptible form on any print-out. The notice may be displayed at a user's terminal at sign-on, or as a continuous display at the terminal.

Furthermore, a permanent notice should be affixed to a box, reel, cartridge, cassette or other container used as receptacle for the copies.

Finally, how do we include the notice © in a program when this symbol does not form part of the usual character set? The answer, as far as the US is concerned, is that the full word "Copyright" or the abbreviation "Copr." may legitimately be used as alternatives.

Bryan Niblett

MICHIE'S PRIVATEVIEW

High road and low road procedures

CONSIDER a class of computing problem for which all sufficiently short programs are too slow and all sufficiently fast programs are too large. Most non-standard problems of this kind were left strictly alone for the first 20 years or so of the computing era. There were two good reasons.

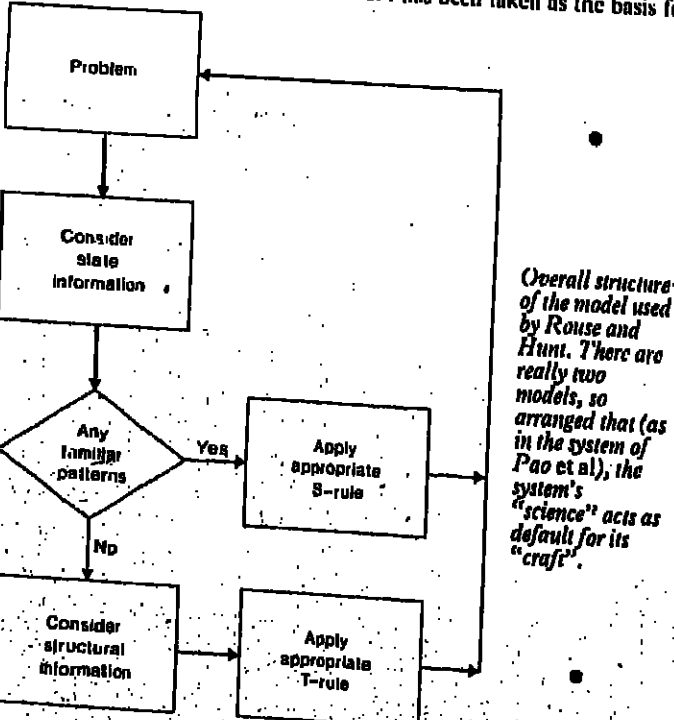
First, the above definition rules out both the algorithmic and the database type of solution. Second, at a pinch a human expert could usually be found who was able at least to compute acceptable approximations — for transport scheduling, job-shop allocation, inventory optimisation, or whatever large combinatorial domain might happen to be involved.

Let us now place problem-solving by machine in the more precise mental context of evaluating two particular kinds of finite functions, namely:

s: Situations → Actions, and
t: Situations × Actions → Situations.

These expressions say that *s* maps from a set of situations (state-descriptions) to a set of actions and that *t* maps from a set of situation-action pairs to a set of situations. The function symbol *s* can be thought of as standing for "strategy" and *t* as standing for "transform". To evaluate *s* is to answer the question: "What to do in this situation?" To evaluate *t* corresponds to "If in this situation such-and-such were done, what situation would be the immediate result?"

If the problem-domain were bi-



Overall structure of the model used by Rouse and Hunt. There are really two models, so arranged that (as in the system of Pao et al), the system's "science" acts as default for its "craft".

cycling, we could probably construct a serviceable lookup table of *s* from a frame-by-frame examination of filmed records of bicyclists in action. But I would certainly be too large for such an approach. The only way to predict the next frame of a filmed sequence would be by numerically computing *t* using a Newtonian physics model of the bicycle, its rider and the terrain.

Machine representations corresponding to *s* and *t* are often called heuristic and causal respectively. Note that they model different things. The first models a problem-solving skill but says nothing about the problem-domain. The second models the domain including its causality, but in itself says nothing about how to solve problems in it.

The causal model partakes of the essence of the traditional sciences, such as physics. The school physics text has much to say about the tension in a string suspending bananas from the ceiling, under stress, the force added if a monkey of stated weight were to hang from a boat-hook of given mass and dimensions having inserted its tip into the bunch, and so forth. How the monkey can get the bananas is left as an exercise for the reader, or the monkey.

When it has been possible to couple causal models with various rules and combinations of search, mathematical programming and analytic methods, then evaluation of *t* has been taken as the basis for

"high road" procedures for evaluating *s*. In "low road" representations *s* may be represented directly in machine memory as a set of (pattern advice) rules overseen by some more or less simple control structure. A recent pattern-directed heuristic model used for industrial monitoring and control provides for default fall-back into a (computationally costly) causal-analytic model. The system thus "understands" the domain in which its skill is exercised. The pattern-based skill itself is, however, sufficiently highly tuned to short-circuit, except in rare situations, the need to refer back to that understanding.

The distinction here spelled out corresponds roughly to that made by Rouse and Hunt between *S*-rules and *T*-rules in the context of computer-aided fault-diagnosis in complex machinery, for example in automobiles. Their diagram, reproduced here, is simple but illuminating.

The *S* versus *T* distinction has nothing whatsoever to do with the strange but widespread notion that problem-solving representations built from causal models are necessarily error-free, proved so by their implementers, and thus in some important sense "sound", while heuristic models are by their nature tainted with unbounded and unquantifiable error. In actuality formal proofs of correctness are no less obtainable for heuristic models than for models of other kinds, provided that the domain is such as to sustain precise mathematical reasoning at all. The only problem-solving device yet to achieve a good and versatile record (the expert brain) has been shown to proceed at "run time" overwhelmingly by the low road. Moreover knowledge engineers are beginning to find in one domain



Donald Michie is Professor of Machine Intelligence in the University of Edinburgh.

after another that almost all skill comes from the brain model and almost all the mental and run-time cost from the causal model.

Perhaps this discovery does not have taken people by surprise in quite the way it seems to have. After all when a *Wizards* Karpov plays lightning chess (a thing else) he can still hold his own against an ordinary Master who allowed all the time in the world for search and reasoning.

In real-world domains an expert high road chess, instance "complex road only" has not yet led to solutions which are (1) quick to the user, and (2) undeniably costly at run time.

Someone says: "I need to have an expert problem-solver, but I don't buy heuristic problem-solving rule models. How do I know they are correct, or will not error bounds?"

He could equally say: "I need to make an omelet, but I don't have eggs. How do I know that they are not spoiled?" The answer can only be: "Get your eggs certified at the very least buy from a reliable farm. If you don't want to do this, then you'll have to lay them yourself."

Donald Michie

10 YEARS AGO

EVERY week hundreds of people were being hoodwinked into paying large sums to private computer programming schools for totally inadequate courses, a Conservative MP, John Hunt, claimed in the Commons. But the Trade and Industry Under-Secretary, Nicholas Ridley, rejected a suggestion that the NCC be given a larger grant for an inquiry into the recruitment methods and training offered by these private schools. Government price preferences for British computers are to be dropped immediately, said Sir John Eden, Minister for Industry. But the government would

continue the policy of the previous government in supporting ICL. ... Following drastic pruning of staff earlier in the year, Computer Enterprises Ltd has issued redundancy notices to a further 25 employees. Out of an original staff of 56, only four are not now being given notice. The UK computer bureau industry increased work done by 1 per cent in the third quarter of 1970 compared with the same quarter of 1969. ... ICL continued to dominate the UK market for computer hardware in 1969, and had a big lead over IBM, according to written evidence submitted to a DoI inquiry.

ComputerWeekly

Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS

Thursday, March 19, 1981

Role of the unions

TRADE unionism is not generally strong in DP departments, for a variety of reasons. One is that computers have been adopted most readily in sectors like banking and insurance where unions are docile and employers have a strong streak of paternalism.

Chiefly, however, it is because computers have replaced usually non-unionised clerical jobs held by the meekest parts of the workforce — women and younger employees.

The fact that there has been no painfully-forged trade union tradition to buy out has in large measure allowed the benefits of computerisation to be rapidly earned. Subsequently a part of those benefits has gone to pay a new elite in the workforce — the computer programmer and his ilk.

He (and she) has been far too much in demand to need to worry about organising with colleagues to negotiate wages. In general he has found himself pushing at the open door of higher earnings to face an employer who has little option but to concede them.

The corollary is that in times of (relative) slump the programmer must not complain if his earnings growth slows, or if he cannot so convincingly threaten to take his coding skills elsewhere. He has no friend with a big stick — his fellows in a trade union — to do anything about it.

But what happens if the wages of a part of the programming community drop behind the levels achieved in comparable jobs elsewhere? And at the same time those programmers prove unable (or unwilling) to move and yet — crucially — are organised into trade unions to face an employer who is unwilling to concede the rises demanded?

This conflict of expectations and rewards is at the root of what has happened in the National Health Service, where staff at the regional computing centres worked to rule.

The main union involved, the National Association of Local Government Officers (NALGO), says its members need between £500 and £1,000 per person to meet their high-standing aim of parity with those doing similar jobs in the private sector. The NHS is struggling to stay in touch with its strict budgets and in no mood to meet the claim.

In the end, during the present action or after some future trouble, it will probably have to. When that happens it should resist the knee-jerk reaction and blame the extra expense on a big, bad union. The union in this case is simply reflecting what its computer staff members see as the realities of their market.

A willing tool

IT has been another bad week for industrial relations elsewhere in the public sector of our industry. Civil servants are up in arms at what they see as the government arbitrarily tearing up the agreed procedure for relating their wage levels to those of the private sector. And in the computer staff at the core of the state's tax-gathering and benefits-dispensing machinery, they have found a willing tool to do something about it.

In choosing places like Cumbernauld, Shipley, Newcastle and Southend for strike action, Civil Service union leaders show themselves well aware of two things: First, and most obvious, is the damage which can be wrought by interrupting the government's cash flow — as sensitive to the economy as a whole as a company's is to its wellbeing.

But second, and becoming more obvious, is the fact the government computer staff do not see themselves as civil servants. A mainframe is a mainframe is a mainframe, even though it nestles at the bottom of a Civil Service structure which at its top puts public duty as point one on its job descriptions.

The people running things at the coal face (an apt metaphor?) act like computer people first and civil servants a long way second. Their unions knew what they were doing in selecting them as the spearhead for industrial action.

1984 and all that . . .

THIS week's example of the strange things people say in the media about computers was sent in by John Hoffmann, of Handforth, Cheshire, who writes:

Yes, you've got a modern kitchen to be proud of. So it grieves me to have to tell you that it's already as out-of-date as the hand-powered mangle and the kitchen range "look" at a piece of meat before deciding how long it should be cooked. Now, for instance, there are cookers which have got a home computers which scan the pantry shelves, decide what we're short of, and automatically order it from the local supermarket.

And expect to see polishing machines which roam off around the house on their own looking for things that need a shine.

Sally Brown in the Manchester Evening News

LETTERS

Renewed interest in Simula — Good staff still hard to find

I WOULD like to dispel any misconceptions that readers may have gained after reading Dr Peter Wallis' review of Simula Begin (CW, February 19) that Simula is only a simulation language.

Simula is an advanced general purpose language. It is an extension of Algol 60 and, with minor exceptions, includes that language as a subset. The extensions lie in the class and co-routine concepts and the associated reference variables, together with fully defined text-handling, character and numeric editing and input/output. It also has built-in list handling facilities.

The simulation facilities of Simula include a pseudo time axis, scheduling procedures, and random distribution sampling. Simu-

lation programs may be written in any of the conventional styles such as Activity, Event or Process mode.

Dr Wallis mentions the influence of Simula on later languages, specifically Ada. Jean Ichbiah, the chief designer of Ada, is a proponent and an implementer of Simula! With all its "modern" concepts and its availability on most mainframes, why is Simula not very well known? The lack of suitable text-books, the complexity of implementation, and the promotion of Simula as a simulation language rather than a general purpose language, are all possible reasons for this.

Over the last few years there has been a renewed interest in Simula. It is now being used in environ-

ments other than scientific: for example, the new computer-based budgeting system for the Swedish Defence Forces is written in Simula rather than the conventional Cobol/Fortran/Assembler mix.

As a result of increasing demand for Simula on new hardware (minis in particular), a portable Simula system is being developed. A Simula newsletter is published quarterly in English.

For further details about, and the availability of, Simula, readers should write to The Simula Group, Norwegian Computing Centre, PO Box 335, Blindern, Oslo 3, Norway.

RONALD G. C. PRINGLE
Computing Laboratory,
Newcastle University.

I MUST agree from personal experience with the view of Elizabeth Last (Letters, February 19), that, in spite of the recession, good staff at degree level are very difficult to find.

At the Systems Group within Liberty Life Assurance we are seeking some ten Fortran analysts: programmers, but even with good working conditions, interesting projects, and high salaries, our "prospective list" is derived from friends and colleagues of present employees rather than as a result of recent extensive advertising.

The lack of interest in new jobs is, not, therefore, confined to Brighton, for at New Barnet we are well within the North London catchment area.

Finally, some advice to those seeking employment: an application received direct by a prospective employer is worth many times more than any paragraph on a recruitment agent's list.

Dr IAN R. WHITE
Systems manager
Liberty Life Assurance Co,
Barnet.

Putting power with end user

CRITICS of APL in your columns, and elsewhere, tend to decry its character set, and often seem to regard the language as some sort of deviant flash in the pan. The letter from James Sinclair (CW, February 19) puts forward a bevy of good points, to which I would like to add a couple.

Firstly, to counter the "new toy" view, it is perhaps not widely realised that mainframe APL time sharing has been available in the UK in some form for around 15 years, nor that world-spanning packet switched networks also have a respectable history, some of them being totally APL-dedicated. Furthermore, just about every manufacturer of hardware has found it desirable to offer some sort of APL, right down to desktop machines.

Secondly, the APL character set may be seen as a successor to the notation traditionally used for algebra, just as Arabic numerals succeeded Roman (have you ever wondered why the Romans never developed calculus?).

If you look at the mathematical expressions in a scientific, economics or actuarial publication, what do you see? Greek symbols, diacritics, superscript and subscript numbers. No wonder no-one designed the standard keyboard for all that.

APL covers the same ground, but with characters in a straight alignment, and it is completely clear and consistent to the eye of man and machine alike. To achieve the same with other high level languages one needs subroutines, and often acres of looping.

APL was first conceived as a notation system for people; only later was it decided to turn it into a computer language. It puts the power and productivity into the hands of the end user, with minimal dependence on the traditional DP priesthood.

S. P. B. DURNFORD
Eindhoven,
The Netherlands.

Software's top ten

IN your Software Special (CW, February 19) you included a table of the top ten suppliers of packaged software revenues.

You should know that our specialist banking and insurance systems company had revenues of \$2.9m in the UK and of \$3.4m in all of Europe during calendar 1979. In the league table this places BIS Software Ltd as the fourth largest package software supplier in the UK and clearly in the top twenty throughout Europe.

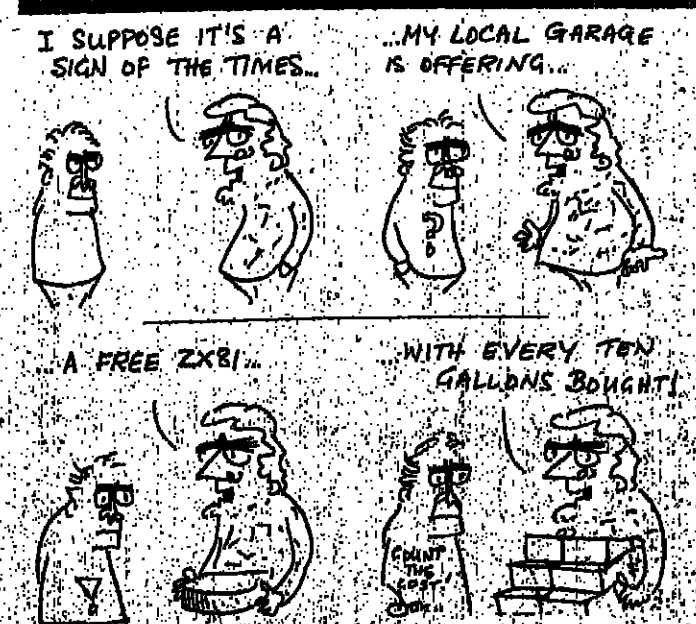
It is noteworthy that the largest UK package software companies are oriented towards systems software and that the top three, Peterborough DPS, Hoskins and BIS Software have all specialised very considerably and over a long period on a specific application sector.

In the 70s, systems software providers were the major contenders in the international package software market. The trend is now established that in the 80s there will be less growth in the systems software sector and growing emphasis on application software, particularly industry specific software for use on mini and microcomputers.

ROGER GRAHAM
Chairman
BIS Software Ltd,
London SE1.

The Editor welcomes letters commenting on subjects published in Computer Weekly or on original topics. All letters must be accompanied by the writer's name and address, not necessarily for publication. Letters may be cut.

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There's no such thing as bad publicity!

WHEN the Beatles arrived in New York on their first visit to the States, they were greeted by an enormous cheering crowd like no one there had ever seen. Yet, if you asked to what he attributed such enthusiasm before they had even given their first concert, John Lennon replied: "A good publicity agent."

I was reminded of this by a shock story in the Daily Express about The Last One, the software generator that has been the subject of a 1984 piece and some correspondence in this newspaper.

Computers to beat all computers, but Britain could lose in the future of British industry if the software which threatens to make redundant the vast army of human programmers.

For expert opinion it, quoted the editor of another computer magazine describing the program as "the philosopher's stone."

What the Express failed to mention was that the editor in question wrote letters to several publications, including this one, asking them to write about The Last One and to plug his magazine in the process.

Never mind the cynics who say software generators have been around for years. We need more of this enterprise. We are always great technically but badly marketed — good word it is to be men with real sales acumen at last.

Great stuff men! If you can convince the Daily Telegraph and the Daily Express, you should have no trouble with the Japanese, Americans, and Germans, and Britain will be Great again!

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Stranded

DO any of my readers in the vicinity of Berkhamstead happen to have a fork-lift truck? I ask this question because an OAP computer has been separated from its nearest and dearest (computer) for lack of such a device.

Bradford University has acquired the ancient Gamma 10 from Berkhamstead School after an appeal in Computer Weekly for a home for the machine. Dr. Yannis Yannakoudakis is to display the computer permanently beside a single-board micro of the same vintage to demonstrate the wonders of miniaturisation.

So the peripherals have gone to Bradford while the CPU sits forlorn, waiting for mechanical help.

Look dear Manchester Evening News, you have missed the minor point that the machine does not actually work. It is a glorification of the youth at North Staffordshire Polytechnic.

Mate means no more noses to grindstone for disabled programmers

THE Computer Weekly Ball of 1977 wasn't just a good time for all; it also sponsored a project to help the disabled — Mate II, a microsystem which can be operated by one digit, be it toe, finger, or nose, and which can also control the domestic environment, drawing curtains, opening doors and switching on lights.

The Microprocessor Assisted Terminal Equipment project, in full, all started unobtrusively enough, as these things do, with a girl student at Essex University, Margaret Pearce was disabled and could only use a pen in her mouth. To help her, the computer department designed a light-touch keyboard for the teletype equipment they already had.

On route to this Brian Wilby and Martyn Lankesier, the original members of the Mate project group, heard of a similar case at the Kelvedon Day Centre and paid the centre a visit.

Here they met Geoff Busby, a programmer/analyst with Marconi in Chelmsford, who had an "operational nose", and who was attached, via a lever to an arm, and a spring to a leg, to a Heath Robinson mechanical device.

His nose was obviously taking quite a strain and as Wilby said, "we could see that poor Geoff's nose was getting very red, and we felt sure we could do something better for him."

They produced, in fact, the light-touch keyboard with facilities for sequential rather than simultaneous operation of the control and shift keys. The key is effectively "remembered" by the processor and is applied only to the key immediately following. The

team had already worked out that the majority of control/shift operations are used for one character only.

This was the point at which both Computer Weekly and the British Computer Society became involved — through Busby's participation in the BCS Committee for the Disabled — and when Mate I became Mate II.

Mate II was to be an intelligent version of its predecessor with enhanced word recall and editing facilities. Despite the entirely voluntary services of the group, given freely in their spare time, the project now needed money, and the ball missed some £1,500 to be administered by the BCS.

The initial design, completed in 1978, called for custom-made software under a specialised operating system, since at that time there were no suitable packages available. The Mate group accordingly enlarged to include Dr R. G. Blake and Michael Coad, both of Essex University, and M. Langton from the Gilbert School, Colchester, advising on the ergonomics of the equipment.

But there it stopped; and there was a long hiatus while everyone tried to agree on how the money should be spent. Meetings were held and committees called, the slow business of bureaucracy taking over. More important to the project group was the official go-ahead necessary to further work on Mate II.

Meanwhile back at the computer industry, technology was changing fast, and in the event, the delay proved an advantage. When, last summer, Mate II was on again,

proprietary micro systems had mushroomed and a ready-made operating system was available in CP/M.

Then things started to move fast. The Westrex Corp when approached by Busby for a discount, donated one of their model 43 printers and in a matter of months Coad had written a set of programs in Assembler to run on any system under CP/M. In fact since the university has standardised on Vector Graphic equipment, the prototype Mate II is on a Vector Graphic MZ based on the ZX80.

All along, Essex University has supported the project with encouragement and facilities.

The group had long since determined that 80% of disabled people can use one finger, toe or other appendage. They aimed to fill the gap between the sophisticated and expensive breath or sound control machines and the standard able user. Psychologically an important point is that both the able and disabled use the same equipment — a single switch operates the modification.

Mate II was designed as a computer terminal or word processor but can also be used as a free-standing micro with word recall facilities.

As well as the light-touch keyboard, and the sequential operation of multiple keys, the word recall function can present stored blocks of information at the touch of a single key, reducing the number of depressions by two-thirds. These may be addresses, phrases, standard letters, program subroutines, or anything that can be pre-set.

The word store on the prototype



Geoff Busby demonstrates Mate II to Julia Schofield, chairwoman of the BCS Committee for the Disabled, and to the Aston, England chairman of the International Year of Disabled People.

is arbitrarily set at 50K, but this could be 100K or 150K as desired. Each store can contain roughly as many individual blocks or phrases as there are printing characters on the keyboard — approximately 5K bytes of space.

Word tables not in current use can be stored on a magnetic disc, giving almost limitless capacity, and insertion and editing facilities, allow for tailor-made tables to suit a particular task. Mate recognises the first word of a sentence from store, promoting the leading letter to upper-case, and takes care of line wrap-around.

Domestically, Mate is a real friend and would be appreciated by even the merely tired. It can be set to draw curtains, turn lights on and off and open and shut doors.

Eight lines or functions are normally available, at an extra cost of £20 for each activation, but a staggering 256 sockets are possible if needed.

And as far they've used none of the money! Now that the prototype is finished the plan is to use the funds to produce a demonstration model, by buying their own Vector Graphic, which Busby can demonstrate to interested parties.

Said Dr Blake, "If there is sufficient interest we would like to farm out the complete package to a manufacturer for large-scale production. If demand is smaller then we could go into limited production ourselves. It takes only two weeks to modify the standard model, and the software is simply

"copy a floppy." Present cost of Mate II was with the hardware. If based on the Vector Graphic B it works on a about £2,500, including Microlog's 5¼in floppy disc drive with capacity of 315K or 630K. The cheaper version costs about £1,500.

The main aim of the project group is still to help the disabled be less apart from his fellow workers — they call Mate II "a aid to job opportunity". They see it as helping the programmer with practical problems, the disabled businessman to cope with his documentation, and the disabled child to keep up with his peers in the classroom, despite a mechanical handicap.

by Pamela Rowe

OP SPOT

DP people remain in front in pay stakes

FOR the purposes of compiling two salary surveys a year, Computer Economics (CEL) of Kingston, Surrey has devised 41 job categories for data processing personnel — 50 counting those in data prep.

"I wouldn't scoff at the number of levels so long as they are related to a management structure," says CEL's Peter Stevens.

"DP people have to be fitted into a separate salary structure" and that means more money for those in DP than those who work elsewhere.

Our wallets are safe because, according to Stevens, there are "too many jobs chasing too few people."

CEL's publicity blurb puts it this way: "Many managements are faced with an unusual personnel situation when considering their data processing department. There is an awareness that salaries in DP tend to be higher, age for age, than those we are accustomed to in other departments, and that the

need to utilise equipment intensively introduces patterns of shift work and overtime not previously experienced in white collar environments."

Table 1 is the more crowded of two sample DP hierarchies which Stevens shows to clients about to join in the salary survey.

"Titles," acknowledges Stevens, "are confusing." Therefore each title is accompanied by a job description so that installations like the Civil Service, which retain non-DP gradings, can fill in the survey questionnaires.

The table illustrates a trend for operations to become involved with systems work. Stevens has found increasingly that the categories described as senior operations analyst and operations analyst are filled by senior operators and shift. It provides a way of stepping up a rung and of leaving shift work without a drop in income through loss of shift allowance.

According to CEL's so-called "capsule job descriptions" a senior operations analyst is "responsible for the provision of operational and production support, responsible for co-ordinating systems testing and production job streams and ensuring that operating instructions, back-up and housekeeping procedures follow the installation standards, normally responsible for the allocation of space on operational disc packs, may report to either technical support or operations manager."

His minion, the operations analyst is defined as a "trouble-shooter" who "would normally have in-depth operating experience, probably to senior operator or above." CEL assigns these two categories to technical support rather than operations and groups them with three network grades and a hardware and technical planning analyst.

This bod is "responsible... for the planning and control of the evaluation, acquisition, implemen-

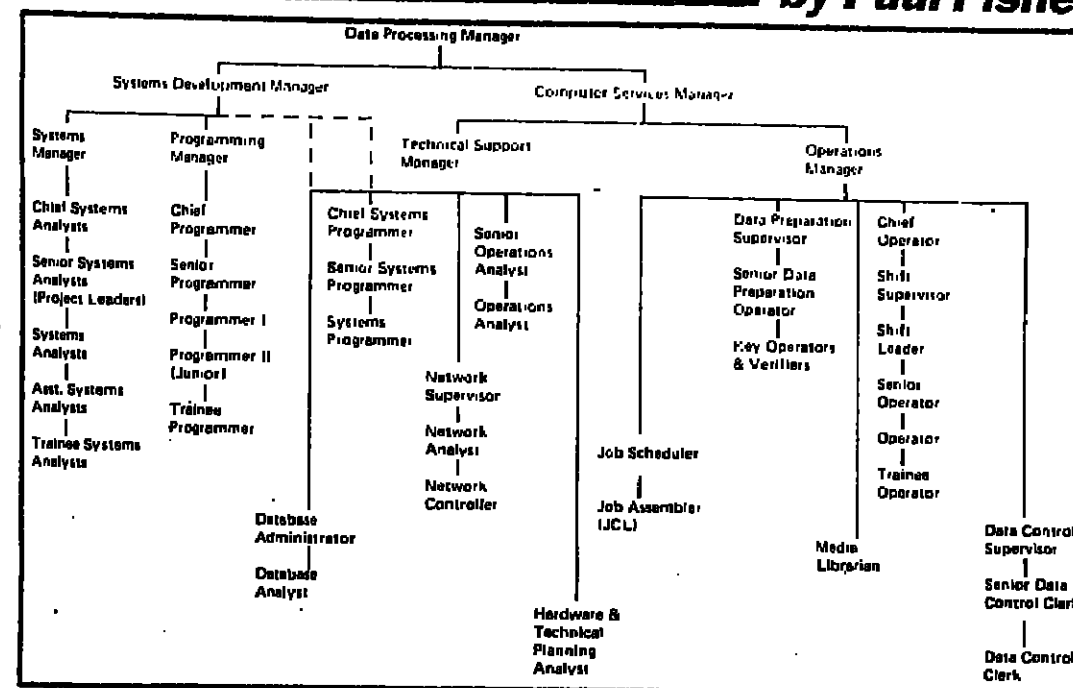


Table 1: This tree, which shows every sign of being a forest, is reproduced by courtesy of CEL.

tation and tuning of all hardware and software." The person who can cope with that many syllables can cope with anything.

The title of hardware and technical planning analyst is one of which Stevens warns: "Treat with caution."

The growing list of job titles reflects what is happening in

installations and new ones are added when the existing categories are not specific enough.

Sometimes a job title is created when the job defined, perhaps for a promotion or for moving someone sideways, closely relates to the work being done. For Stevens it only becomes a "real job title" when the job is defined and some-

one has to be recruited to do it. CEL is the clear winner in Op Spot's tally of job categories. Fifty grades must be enough to handle anything. No matter that many sites don't have that number of employees — I know plenty of ops who would be happy to take home the pay for a couple of extra grades.



Surrounded by IBM terminals and Rascal comms kit, network controller Sue Wright says: "The fact that I used to be an operator has helped me."



Surrounded by IBM terminals and Rascal comms kit, network controller Sue Wright says: "The fact that I used to be an operator has helped me."

Sue keeps the users sweet

SUE WRIGHT has been network controller at May and Baker's Dagenham site since last summer. Previously she was with the company as personal assistant to the commercial services manager so she knows "a lot of people" who work well away from DP. Before joining May and Baker, Sue was an operator with National Westminster, but says: "I'm not telling you how long ago that was."

She looks after "at least 100 screens", most of which are scattered around May and Baker's chemical manufacturing and administration complex. The terminals, all online, are in four other UK sites — eight terminals at Norwich, two each in Otago and Brentwood and one in Dudley.

The network used to be the responsibility of operations, section head, John Bines but he handed over to Sue. She has been on one course with Infotech and will be attending a Rascal course soon. The site has had Rascal models for over two years.

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Confusing world of telecoms

VIDEOTEX, Viewdata, Oracle, Prestel, Ceefax, Viewtron... Do they all whilst in a communications vortex, in which the only clear fact to emerge is that telephone boxes will be painted yellow? If so, stick close, and hitch a lift on the guide to telesext.

The generic name is videotex, which can be broken down into serial access and viewdata — telephone linked and allowing random access. In the text category are Oracle and Ceefax, both of the UK, and Antilog from France. The Viewdata includes Prestel (UK), Viewtron (US), Telidon (Canada), Captain (Japan), Telenet (Finland), Viditel (Netherlands), and Bildschirmtext (West Germany).

The three UK systems, Ceefax, Oracle and Prestel, have all been used quite extensively to support education. Apart from a little collaboration on special projects, Ceefax backs up BBC programmes, like Exploring Science for schools, and Merry-go-round, while Oracle is the Independent Broadcasting Authority version, used mainly for adult education.

Two of its programmes are Make It Count and Numbers at Work. Development of Oracle is concentrated on its role in retrieval. A project is afoot, sponsored by the Council for Educational Technology and the Department of Industry, to broadcast computer-aided learning programs within the Oracle framework for downloading into a remote intelligent TV set.

Prestel is organised by British Telecom, which insists it is simply the common carrier of data. Three other groups involved are the data originators, which take care of them more than passing the television manufacturers, and a little slow with mass production of suitable

sets; and the users, currently about 8,000 of whom have become the modern pioneers of the telephone.

The Council for Educational Technology has set up an umbrella service now London to help educational institutions and slightly buffer against the high charges. Some umbrella names are concealed by this umbrella — the Open University, the National Extension College, Schools Council, British Universities Film Council, Business Education Council, National Federation for Educational Research, the Technician Education Council, the National Audio Visual Aids Centre and the Council for National Academic Awards.

The umbrella provides a mini as an update terminal for editing frames on to the system, and a floppy-based micro for research into intelligent receivers.

Information retrieval is also catered for and data is held on course guides, entrance requirements, grants, available, and books, films and aids which can be obtained.

A form of interaction is possible using a response frame facility. Theoretically one could sit at home and select, enrol, and even pay for the evening class of your choice without even opening the door. The same doesn't apply to the class on those cold, wet November evenings. The facility is expensive on frames, though, and has had only limited use.

PUZZLER

TRY this one in your head: It's quite easy... but particularly appropriate for this column because, by a coincidence, the figures involved are just right for me and my teenage son.
In the year 2000 my age will become a perfect square, and that of my son a perfect square. Several years ago, the reverse was true: my age was a square, and his a cube.
How old are we on our respective birthdays in this year, 1981? See page 42 for solution.

'Dasher' graphics display terminal makes its debut

THE Dasher G300 graphics display terminal from Data General has intelligent graphics, extended alphanumeric capabilities, and compatibility with existing Dasher display terminals.

A Graphics Command Interpreter (GCI) executes English-like high-level graphics commands for relative and absolute positioning; plotting lines in polar and cartesian co-ordinates; plotting arcs and straight lines; defining line style patterns; drawing solid rectangles and circles; filling any closed shape; defining graphic macros and drawing text in a wide variety of formats.

On power up, the Dasher G300 performs an internal self-test. If no problems are detected, the terminal goes online, permitting communications with the host Data General computer. Any detected errors cause a corresponding diagnostic message to be displayed.

After normal power-up, an operating system output command loads the graphics microcode into the terminal from the host system. The terminal verifies the GCI's integrity during loading.

Two modes of graphic operation

are selectable. In the abbreviated command mode, graphics commands are standard Dasher terminal control-code sequences, permitting their use while displaying ASCII characters as a conventional alphanumeric display.

In the mnemonic command mode, graphics commands are English-like character strings, such as Line and Circle, which are then converted to control. This mode allows program listings to be easily read and understood and permits graphics programming in almost any computer programming language. In mnemonic mode, since all ASCII character strings are interpreted, normal text is plotted with a special text command.

Contained within the GCI is a complete library of the lines needed to draw all the characters supported by the G300 in alphanumeric terminal operation mode. The user can also define an additional set of characters.

Also, during program execution, the G300 can "trap" graphics commands containing errors. In this Error Trap mode, a detected error causes an error bell to sound,

output to the terminal is halted, the command is displayed in a command view window at the bottom of the screen, and the terminal is placed in a Single Instruction Execution (SIE) mode.

Text character sets contained within the G300 are US ASCII, English, French, German, Spanish, Swedish and Danish. The keyboard determines the native character set of the display. In addition, all character sets are software-accessible at all times.

The keyboard includes a typewriter-style main keypad, 14-key numeric keypad, 15 program function keys, and 5 local function selection keys. A parallel printer port provides connection with a slave printing device.

An asynchronous interface communicates with any host Data General computer at speeds up to 9600 bps. Both RS-232 and 20ma current loop interfaces are provided.

The Dasher G300 costs £2,431.

Data General (CW), Hounslow House, 724-734 London Road, Hounslow, Middlesex TW3 1PD. Tel: 01-572 7455.

Award winners add to office furniture range

A RANGE of furniture for computer terminals and word processor equipment is available from Lucas Furniture Systems, winners of the Royal Society of Arts Presidential Award for Design Management.

It is designed around a few basic components, which can be adjusted to accommodate a variety of proprietary equipment. Constructed from timber panels and steel components, the furniture is available in either light oak or teak solids and veneers.

Within the range are a freestanding table, a compact sliding top work station and a turntable unit. Cables are provided to conceal wiring.

The freestanding table, which incorporates a lower level keyboard platform, is 800mm wide with an overall depth of 800mm. It can be used as a separate unit or

linked at right angles to a standard desk to form an L-shaped work station. If a shared facility is required, the table top can be linked to adjacent desks.

The turntable unit provides a shared facility for up to four operators. It can be fitted to any work surface or work top link and comprises a main platform for the VDU, with an angled platform incorporating an adjustable wrist bar for the keyboard.

The 1400mm wide sliding top work station combines computer terminal facilities with normal desk functions. An adjustable platform is fitted at the rear of the desk with an adjustable keyboard tray and adjacent storage compartment beneath a sliding work surface at the front.

Lucas (CW), 616 Wick Lane, London E3 2JJ. Tel: 01-980 3322.

Enhanced fake interface

AN enhanced Interfacer system, a piece of diagnostic and patching equipment for anyone using modems and terminals, is available from Modular Technology.

The addition of a Glitch Trap for catching high speed transients, is claimed to have improved layout and circuitry, and has made Interfacer effective in faking the necessary interface so that plug-to-plug compatible equipment can immediately be interfaced by a user.

This is necessary because on delivery of plug-to-plug compatible equipment, the user often finds that the V24 sockets are wired differently. Interfacer can quickly be plugged between the units to monitor the status of up to 18 interface circuits at a time, diagnose any variation and fake the necessary interface to allow continuous

transmission. The system has an added feature for trapping positive and negative high speed transients capable of interfering with transmission. The Glitch Trap catches such transients and shows them up immediately on the LBDs.

Each V24 signal can be broken by means of small switches and then re-connected to other pins with small patch cables. In this way, faults can be diagnosed and new interface cables developed before any soldering of new plugs and sockets needs to be done. An integral flexible cable and D-type plug connects modems or computers and terminals plug into a D-type socket. Interfacer meets Post Office and PTT standards.

Modular Technology (CW), PO Box 117, Watford WD1 4TD. Tel: 01-421 8626.

Time-saving data collector

THE Datamite 1000 is a general purpose, hand-held data collector with a solid state memory capable of storing 64,000 alphanumeric characters.

The unit is claimed to offer a faster, more reliable data collection and is also capable of interfacing with a range of electronic instruments such as bar code readers.

Benefiting the user are said to include substantial cost/time savings and less opportunity for human error. Computer down

loading of the Datamite reduces the amount of data to be entered, and the unit also provides prompt feedback to the operator that lowers the chances of missing data. Errors can be recalled, edited and compared with entries of previous studies. Following data collection, the data can be transmitted via an interface cable to the user's own computer or terminal for report generation.

Structural Monitoring (CW), 25 Blythwood Square, Glasgow G2 6BL. Tel: (041) 236 3061.

GRAPHICS - 1

Graphics is now sophisticated tool in CAD and for presenting financial data. A three-page survey starts here.

The Cambridge phenomenon — what it means to graphics

by Peter Levi
OVER the last decade a phenomenon with a good deal of significance for British industry has occurred in Cambridge. Forty-one computer-based high technology firms have been established there during the period, and are now flourishing.

The impact on the graphics field has been particularly marked. There cannot be many British companies whose turnover increased by around 100% in 1980, yet that has been reported by four of the main Cambridge firms in graphics — Applied Research of Cambridge (ARC), Cambridge Interactive Systems (CIS), Laser Scan and Shape Data.

The Cambridge phenomenon occurred for a variety of reasons discussed below, but the strong impact on graphics was originally due to the fact that a number of very bright people who happened to be in the University at the right time (the 1960s), were interested in CAD/CAM. For instance, there were computer-aided design groups in both the computer laboratory and engineering department.

Shape Data was set up in 1974 by four members of the computer laboratory's CAD group, which one Shape Data director, Charles Lang, ran for 10 years; another member of this group, Peter Woodsford, is now Laser Scan's technical director and a third, Crispin Gray, is ARC's managing director.

The University CAD groups were already well established when in 1968 the Ministry of Technology set up the Cadcentre in Cambridge. This government research body, which now comes under the DoI was established to help develop CAD/CAM systems appropriate to the needs of British industry as well as develop for the commercial market ideas coming

out of universities and research establishments.

Cambridge was chosen for a number of reasons; the expertise was already there and a spare ICL Atlas computer was available. Moreover, the University computer laboratory had a similar computer for which an innovative time sharing operating system had been developed.

The result was that more research was done in Cambridge on CAD/CAM than in any other part of the country, and since the factors which encouraged the Cambridge phenomenon in general have also helped the specialist graphics companies, these firms now lead the world in CAD/CAM software.

A number of important factors have contributed to the Cambridge phenomenon; they include positive moral encouragement from the University, a sympathetic planning authority and helpful banks. At the end of the 1960s the government exhorted universities to increase their contacts with science-based industry.

As a result Cambridge University set up a committee chaired by Sir Nevill Mott, whose report prompted Trinity College to invest £1½ million in developing Britain's first science park, the Cambridge Science Park (CSP). This provided some of the emerging high technology companies with much needed space — Laser Scan was the first tenant in 1973.

The University has created a positive environment for the phenomenon by encouraging industry's University contacts and by giving facilities access to the University's laboratories. The feedback for the University has included a 5-year research grant to the Cavendish Laboratory given by Laser Scan. This firm grew out of the Cavendish in 1969, and is now the largest Cambridge graphics firm, with 70 employees.

Many of the firms involved in the phenomenon were spawned by the University and Cadcentre. During the 1960s, in contrast to American attitudes, researchers would have been frowned on if, after making a discovery with the help of government money, they had gone off to exploit it — but not now.

This change has coincided with the cut-back in government research grants, which has left many researchers with the knowledge that academic life is no longer secure.

The City Planning Authority has been helpful in its interpretation of user rights. For the last 20 years the Authority was known for not encouraging expansion, but now this attitude has been modified. The recently approved Cambridge structure plan allows for considerable growth of the Milton area over the next 10-12 years, about 50 acres being allocated for industrial use.

Untypically, ARC (which

specialises in large integrated interactive systems for building design, engineering design and production) started with one employee and 20 shareholders. It is now one of the established central Cambridge firms, with 27 employees.

This company has had a good relationship with NRDC, which provided a significant part of the investment to develop ARC's Building Design System (BDS). ARC sells its services and systems overseas and has distribution networks in South Africa and Australia, as well as a North American subsidiary; it has just signed a marketing agreement with McDonnell Douglas Automation.

Banking has made a further contribution to the phenomenon by publicly identifying it, thus helping it to gain cohesion. The person responsible was Matthew Bullock, a Cambridge assistant branch manager of Barclays before becoming personal assistant to Sir Anthony Tuke, chairman of Barclays.

Others may have seen what was happening but Bullock actually did something about it. In 1979 he called a meeting of 12 directors of the more established companies — the beginning of an informal group, the Cambridge Computer Co-operative. Each director wrote down the names of all the computer-based high technology firms he knew.

They were astonished by the list's length. Bullock arranged for speakers on subjects such as contract law and product protection and the Co-operative now provides a useful discussion forum for

the companies to air their problems. Bullock also alerted a group of efficient solicitors and accountants to the importance of helping these firms.

Up to now the CAD/CAM firms have largely worked for the larger industrial companies, but suddenly medium-sized and small UK businesses are showing enormous interest in CAD/CAM systems.

This has happened for a number of reasons. The combination of cheaper and more reliable hardware and the revolution in the technologies of microcomputers, plotters, graphic displays and general time sharing services have brought the hardware and software within the range of many people.

And the light to remain competitive at a time when labour is becoming increasingly expensive and (ironically at a time of unemployment) the difficulty in finding skilled designers/draftsmen is forcing UK business to see if the new technology will provide tools which can make them more competitive.

CIS was set up to serve their needs in the mechanical engineering field. Spawned by the Cadcentre four years ago, it produces Medusa and Cablos, two CAD/CAM turnkey systems which can be adapted to a particular company's needs, and it already has 25 employees.

Nigel Payne, the managing director of the new CIS offshoot, CISP (dealing in the packaging and marketing of its products) says: "With world-wide economic recession there is a surge of interest from businesses in advanced countries. They are

looking for the appropriate computer graphic system to shorten the time between design and manufacture."

CIS has just started a US company and already sells to heavy electrical and mining industries in Europe and the UK.

CIS believes it is combining the best attributes of British software with well-engineered hardware — usually Prime computer with Tektronix storage/graphic terminals, though it will increasingly use raster-scan devices in the future. CIS assesses a company's need, designs and fits a system, trains personnel and provides a strong back-up service.

For instance, CIS' Medusa (basic price £63,000) can be interfaced with Shape Data's sophisticated solid geometric modeller, Romulus, which contains a complete description of each component's shape.

Next, if structural analysis is required, Medusa can be interfaced with software from FECS. FECS is another Cambridge graphics company, which specialises in finite element mesh generation with its Femgen package, and in inspecting finite element analyses with another package called Femview.

Finally, CIS will provide Medusa with the means to generate a numerical control tape to control production and equipment.

Shape Data's Romulus is incorporated into other CAD/CAM turnkey systems, Ferranti-Gecet's CAM-X and Contraves' Zurich. Contraves' Charles Lang of Shape Data notes: "It is also bought by companies who incorporate it into their own in-house systems."

Another area of Shape Data's work is custom-made software. Lang gave me an example of a continental company which makes centrifugal pumps, because the history of their relationship is typical.

The company started by giving Shape Data a trivial job to run on

● Turn to page 22

COMPEC EUROPE '81

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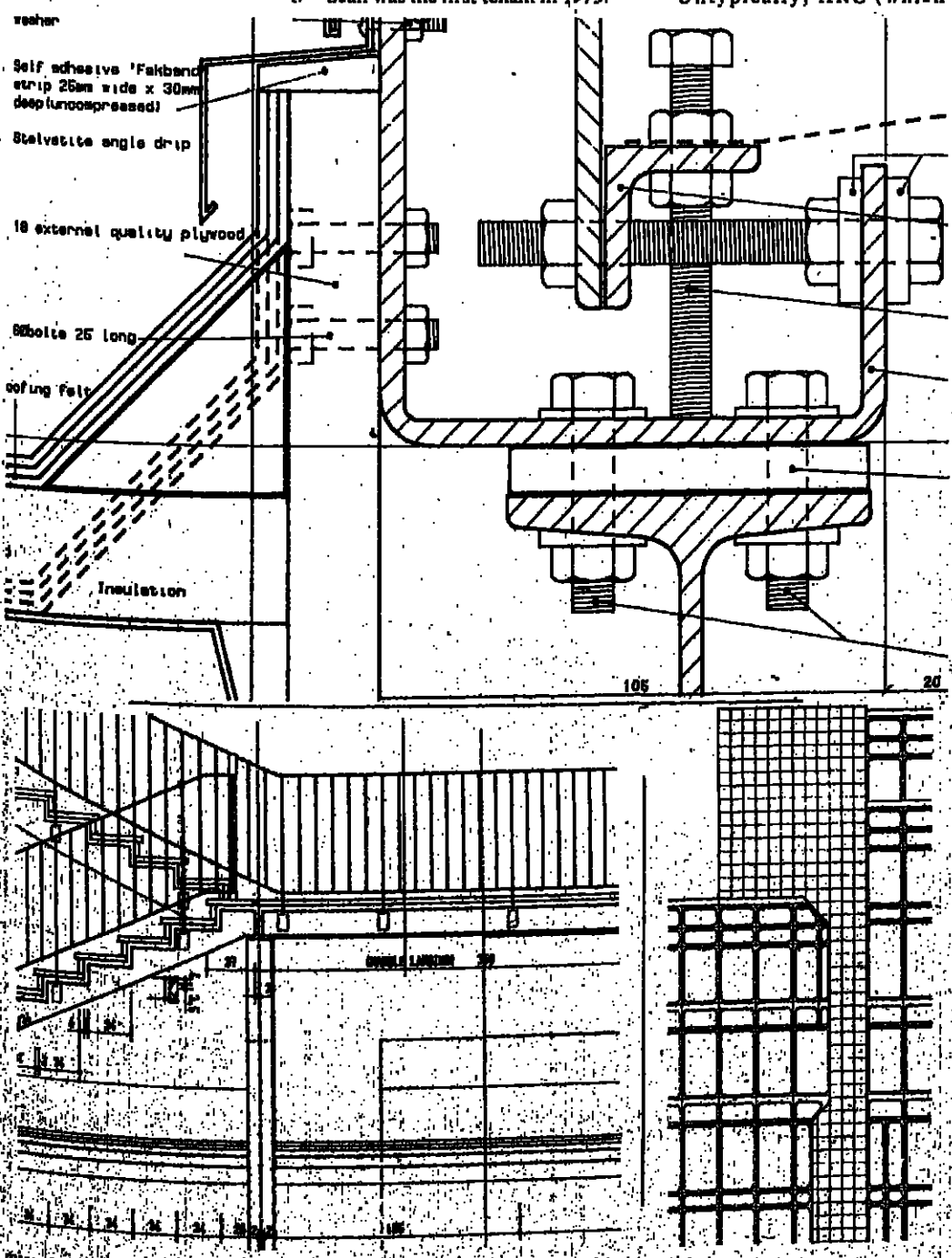
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Three scale drawings of a building produced by the GDS interactive computer-based draughting system from Applied Research of Cambridge. At top is a cross-up of the building's steel junction, originally drawn full size; above, left is a detail of a structural wall-joint; first drawing on scale 1:25; above, right is an elevation (original scale 1:50).

The level of interest is 'enormous'

● From page 21

Shape Data's computer. Then a commission followed for them to write some programs which were loaded onto a service bureau computer. As use of the programs built up, the company bought its own computer, as well as Shape Data's software tools so that they could develop programs themselves.

Now, after four years, the company has made a complete switch in the new technology; it no longer makes any manual drawings for the design of pump volutes, and producing prototypes now takes a few weeks instead of several months.

Shape Data now has 13 employees and its software is distributed in the US and Canada by Evans and Sutherland Computer Corp of Salt Lake City.

A major thrust at the Cadcentre has been in chemical engineering and the process industries. The Cadcentre employs 150 people, 120 of whom are technical staff, equally divided into computer scientists and professional engineers.

One of its earliest projects was the Gino software, a Fortran graphics package dealing in simple line graphics in 2D and 3D. Later development in graphic applications range from laying out pipes in a petrochemical works to designing shows or simulating the way a machine tool cuts metal.

A new area being developed is image processing, which is built on colour graphics.

The Cadcentre's prime objective is to evolve better CAD/CAM systems through undertaking joint projects with industry. Some companies pay for the service in full and other apply for a 50% government grant. Last year the Cadcentre cost £3.2 million to run and recovered £1.5 million through services and royalties on software licences.

For the construction industry, ARC has developed two approaches. ARC grew out of the University's School of Architecture in 1969 and its experience has enabled it to produce a combination of 3D modelling and a wide draughting capability.

This company's BDS package is a modelling approach which makes a 3D computer model of a large complicated building (it was originally used for a hospital), from which assessments and analyses can be made.

General Draughting System, GDS, is intended to carry out all functions required of draughting in the construction industry, from producing maps to site layouts and engineering details. GDS has been used to design an airport terminal and is being used by the Property Services Agency, for its Post Office telecommunications headquarters.

Two other industries to benefit from the Cambridge graphics phenomenon have been cartography and security printing. Laser Scan's high resolution display and plotting capability serves both, as demonstrated by the HRD1, which has a high resolution of approximately 8,000 lines in each axis and a large screen display.

The high resolution display is used for security printing because of its ability to produce direct hard copy output. People producing sensitive documents can check what they see on the display screen before producing a hard copy from which they can print.

Laser Scan's contribution to cartography has been not only in display and plotting, but also in producing software to run on such machines, and more recently on other people's machines. Laser Scan has sold about 16 HRD1s (at £60,000 each) to clients as varied as the Ministry of Defence and the mining industry.

At the moment Laser Scan's Fasttrak Digitiser is only used for

User markets expand as costs are cut

by Howard Rippiner

SINCE the early days of computers, there has been a requirement for the pictorial representation of data, but initially the generation of graphics required a great deal of computing power and memory capacity, which made it too expensive for general-purpose use. However, in 1968 the development of the bistable direct-view storage tube opened up the market for lower-cost graphics terminals, and when the first commercial terminal using this approach was introduced in 1971, it cost less than half the price of its nearest equivalent.

The first storage-tube devices to come on to the market place offered a display capability of 266 line pairs, which meant that the user could address 1024 points horizontally and 780 points vertically. As the need grew for increased graphics complexity, manufacturers developed larger-screen terminals as well as techniques for "zooming" in on a particular section of the graphics picture. At the same time, terminals offered more comprehensive graphics facilities, including different hardware-generated character sizes, line types, etc.

Built-in microprocessors have added intelligence and storage capabilities to the basic graphics terminal. Typical of the features offered is the ability to call up local "memos" consisting of standard, regularly used shapes, and local picture editing has become standard on many systems. Digitising tablets and flexible-disc stores add further to the terminal's manipulative and storage abilities, as well as minimising the need for data communication with a host computer.

One of the most important developments in recent years has been the combination of refreshed display information with data retained on the storage tube, which means that selected foreground information can be manipulated against a background of high-resolution stored data. The refreshed graphics facilities allow the user to display, select and manipulate moveable pictures, while the storage facilities allow the display of very large amounts of graphics and textual information without a flicker.

Another important sector of display technology uses raster-scan techniques to build up the graphics picture. Raster-scan displays have come into their own recently because of their ability to produce colour graphics, which has compensated for their relatively limited resolution. Colour is becoming increasingly important in many graphics applications, such as computer-aided design, process control, mapping and architecture, where several different levels of information need to be overlaid or viewed simultaneously without confusion.

Raster-scan displays have also brought about significant improvements in the imaging of graphics and alphanumeric symbols in the same picture. The availability of low-cost video chips and lower-cost memories has stimulated the development of techniques such as the virtual bit map, which allows many pages of data to be stored with full facilities for scrolling the data.

In virtual bit mapping, the operator uses a software program to establish a graphics region on the display screen. The rectangular graphics region can be displayed anywhere in the display area, while the remainder of the area considered as alphanumeric. If the graphics region is then further divided into graphics cells, and the program is arranged so that graphics memory is allocated only to those cells containing graphics information. The remaining graphics cells appear in the display as

A picture is worth a thousand words in company computing

by John Dimmock

MOST people are aware of the many changes that have been brought about by the rapid increase in the use of computers throughout industry and business. Not quite so obvious, but perhaps more significant, are the changes taking place in how companies are utilising their computer facilities.

One area where this becomes quickly apparent is in computer graphics. This section of the computer market is currently enjoying the fastest growth rate within the industry, and the reasons are simple.

The first companies to recognise the advantages of computer graphics were perhaps understandably those where the production of graphs or drawings played a major part in the company's activities, and where, traditionally, information needed for design, analysis and costing had always been represented pictorially.

In those early days manufacturers of pens and plotters sold their machines mainly into the architectural, surveying and structural engineering industries.

These companies had a high throughput of drafting, and by using a plotter were able to produce extremely accurate drawings at high speed, thus drastically reducing design labour costs and the time taken on a project between the initial design or drawing stage through to detailed finished drawings for production purposes.

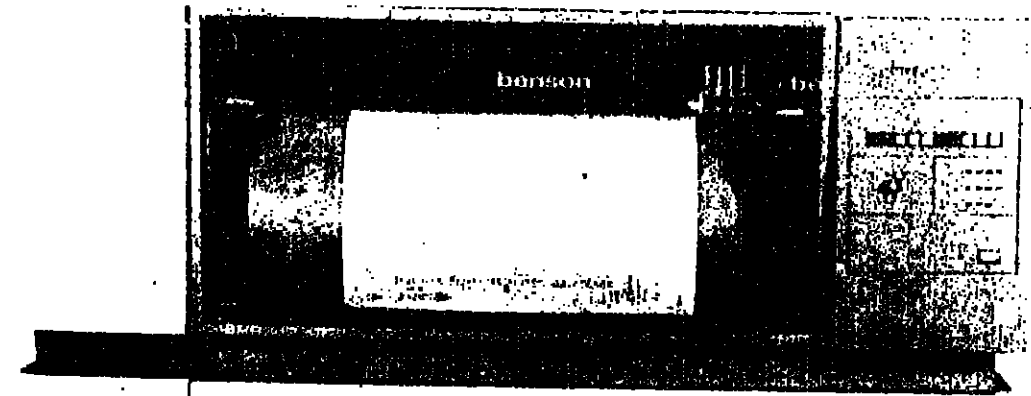
As these benefits became accepted, a demand came from other fields, notably in electrical and mechanical engineering, local government, hospitals and a wide range of research applications.

The decision to purchase a computer system in these organisations was usually made for reasons of improved efficiency and reduction in overhead costs leading to an increased return on investment.

Once installed, the system, if efficient, did just that, but usually created new administrative problems in its wake for management to iron out. For example, vast quantities of digital data presented in a form which was unfamiliar to the staff now had to be checked, cross-checked and somehow presented in a way that could easily be assimilated. Of course, all this data was accurate, but humans had to analyse it and act on the results.

The addition of colour to the graphics display requires a change from a single memory plane to three memory planes, with additional planes offering a choice of eight colours. A combination of hardware and software techniques allows any selection of eight distinct colours to be made from an overall palette of 64, and the mixing of dots of different colour allows additional colours to be generated. In fact, it is possible to generate a picture containing 128 distinct colours from patterned mixtures of the eight basic shades.

One area of graphics which is suited to some specialised applications is that of calligraphic displays, in which the vectors are continuously refreshed on a conventional screen without using raster scanning. To avoid flicker, the information needs to be written between 30 and 50 times each second, which means that a processor at least as big as a



The author is sales support manager of Benson Electronics Ltd. Claimed as one of the world's fastest pen plotters, Model 5342 from Benson

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'The applications of computer graphics continue to grow daily. Almost anyone who has to interact with a computer can do so more effectively with the aid of graphics.'

minicomputer is required merely to drive the display. Hence calligraphic systems are very expensive. Moreover, even with the amount of processing power there is a limit to the amount of information that can be displayed without flicker.

The big advantage of calligraphic displays is their ability to handle dynamic information, so their use tends to be restricted to applications where this is an essential feature and where cost is not a primary consideration. Flight simulation is a typical example.

However, intelligent graphics terminals and desk-top graphics computers are now available with a significant amount of refresh capability and have made inroads into what might have been a potential market for calligraphic displays.

The applications of computer graphics continue to grow daily. Almost anyone who has to interact with a computer can do so more effectively with the aid of graphics, and as the costs of computer systems come down, so the user markets expand. The initial impact of graphics on engineering and scientific applications has now been extended to a much wider field. Computer-aided design and manufacture are key areas and for the future two big growth areas are laboratory data analysis and business applications.

Another important future growth area is colour graphics. We are already seeing the introduction of low-cost colour hard-copy units which will virtually remove the last remaining barrier to the general adoption of colour graphics techniques in a wide range of industrial and business applications.

Graphics is now ripe for development.

'This section of the computer market is currently enjoying the fastest growth rate within the industry.'

It became clear that only half the problem had been solved. What was needed was a method of representing all that data, and one that could be quickly and easily understood.

Visual display terminals helped, but were usually not capable of any more than simple bar charts and flow diagrams which still were presented in a digital form.

The old saying, "A picture is worth a thousand words," became a reality, and so graphics display terminals and the use of plotters for hard copy spread to all sections of the computer market.

A drafting machine or plotter enables highly accurate drawings or graphs to be produced rapidly which convey information pictorially, thus giving a permanent visual representation of what is often just a jumble of figures and

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Excellent conditions of employment are offered including good salaries, a review is due in early summer, five weeks annual leave and relocation expenses where appropriate. The company's ongoing expansion yields real prospects for career development within an exciting environment. Telephone the number below to discuss these positions in detail or write quoting RN2/1903/CW.

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Applicants will offer in excess of five years' data processing experience and may currently be engaged in one of the activities described above. A knowledge of high-level languages — such as COBOL or FORTRAN and experience with some of the relevant hardware is important although candidates who can demonstrate sound experience of other software and hardware are invited to apply.

The company offers an excellent package of benefits together with the opportunity for travel to overseas locations.

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Ref: N1/1903

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U.K.

Mark IV Cobol/CICS/OLI Assembler/CICS/DLI RPG/System 34 IMS	Programmer/Analyst Senior Programmer Programmer Programmer/Analyst Designers-Analysts Programmers Programmer/Analyst Programmer/Analyst Programmer/Analyst	London N.W. Essex London S. London-London Essex Essex London
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For more information telephone:
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(4720)

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Geosurvey International require a Senior Programmer to join a team engaged in processing and interpreting airborne geophysical data on SEL and PDP equipment. At least 5 years' technical experience is essential. Graphics applications experience would be an advantage. To arrange an interview contact: Data Processing Manager, Geosurvey International Limited, Geosurvey House, Orchard Lane, East Molesey, Surrey KT8 0BY. Telephone: 01-897 0591 or 01-398 8371.

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Applications are invited from suitably qualified persons, regardless of sex, race, colour or national origin, for appointment to the above Chair. Computer Science is currently a Division of the Department of Applied Mathematics but it is to become a fully independent Department in the near future. The successful applicant will be expected to develop and lead the new Department in its teaching and research efforts. Computer Science is recognised as a developing professional discipline in which experience, standing in the industry, and consulting work may be as significant as formal academic qualifications. The salary attached to the post will be in the range R17 100 - R22 200 per annum plus a thirteen point bonus, pension and medical aid in addition the Chair carries a generous supplementation. £1-R17.72 approx.

Interested persons should obtain the information sheet relating to the post from the London Representative, University of the Witwatersrand, Clarendon House, 278 High Holborn, London WC1V 6E, or from the Registrar (Staffing), University of the Witwatersrand, Jan Smuts Avenue, Johannesburg, South Africa 2001, with whom applications should be lodged not later than 7th April, 1981. (4886)

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Contact: Janet Chivers

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This work involves the implementation, maintenance and development of all systems software (future TP work is envisaged), the design and production of special software and utilities as required, and the provision of a support function to the Operations Group and all users of the bureau service.

The Department is also active in office automation, microcomputing, specialist computing, computers and database projects - there could be scope for your future involvement in these development activities.

Ideally, you should have some experience in systems support, or a sound technical and working knowledge of large computer systems. A good degree would be an advantage. Experienced Applications Programmers who would like to make a career change into systems work will also be considered.

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Applications are invited from Honours Graduates in Maths, Engineering or related sciences with at least 3 to 4 years experience in the relevant field of computing. Managerial experience would be advantageous. Vacancies also exist for scientific programmers and analysts in similar positions and with similar qualifications at a lower level.

Please write, giving full details, to the Recruitment and Staff Relations Officer (marking the envelope 'Confidential').

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LOTIAN REGIONAL COUNCIL

DEPARTMENT OF EDUCATION
STEVENSON COLLEGE OF
FURTHER EDUCATION

Computer Operator

- Department of Business and
Computer Studies

The College equipment includes a 16 terminal ICL 2902, a batch terminal mini system and a number of micro systems. Preference will be given to the holders of SNC in Computer Operations/Data Preparation or equivalent qualification.
Salary on Scale £225-£480.

Application forms may be obtained from the Registrar, Stevenson College of Further Education, Bankhead Avenue, Stirling, Edinburgh EH11 4DE.
(4884)

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(Ref. B.927)

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Experience - a minimum of two years' experience in desktop together with knowledge of the George 3 or VME/B operating systems.

Application forms from Assistant Chief Executive (Head of Manpower Services), Town Hall, Bromley, Kent. Tel. 01-484 3333, Ext. 3218. Closing date 31st March, 1981.

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EMPLOYER POSITION MACHINES? OPERATING SYSTEMS LANGUAGES APPLICATIONS

Please continue on separate sheet of paper if necessary, or send us your curriculum vitae.

I understand that the above details will be treated in the strictest confidence, and no action will be taken without my consent.

Signed _____ Date: _____

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COMPUTER STAFF LTD., 01-434 2889/01-439 9582

East Anglian Regional Health Authority

Computer Division

Systems Designer/ Programmer

Salary within the scale £8,312 to £7,695 - depending on qualifications and experience.

Applications are invited from systems designers and programmers with at least two years' experience, to work on a variety of financial applications for the Health Authorities in East Anglia. Some programming for an ICL mainframe is required but the main thrust of present development work is on VENUE DATAPOINT minicomputers and experience with these computers will be particularly beneficial.

Further details and application forms are obtainable from the Regional Personnel Officer, East Anglian RHA, Union Lane, Cambridge CB4 1RF (Tel: Cambridge 61212, Ext. 325) Closing date: 6 April, 1981.

UNIVAC 1100 DMS SPECIALIST

Salary

£25,000 P.A.

We are looking for a DMS specialist to work as a consultant in West Germany, district of Hanover, for a contractual period of not less than two years. The successful candidate will be working with a highly qualified team of international specialists on one of the largest U1100 Systems in Europe. The remuneration will be over £2,000 per month.

The candidate should have at least 7-10 years of experience with IMS, both on the Systems and on the Applications side and should be willing to learn German, although all the potential working colleagues master the English language.

Applications to Computer Weekly, Box 1132

BOX NUMBERS

Box number replies should be addressed to:

Box Number _____

c/o Computer Weekly

Quadrant House

The Quadrant

Button, Surrey SM2 5AS

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LONDON up to £10,653

We are looking for an Analyst/Programmer to join the Database Section of our Computer Services Department. This Section designs and prototypes information systems for both technical and commercial application areas; provides a database management function and serves as a consultant within British Gas.

A varied programming environment is available based on Univac 1100/72, and ICL 2972 hardware. Conventional high level languages of COBOL and FORTRAN are extended by means of Codasyl (Univac DMS 1100, ICL IDMS) database and interactive Query languages to meet the needs of individual problem areas.

We welcome applications from candidates with a degree in a numerical subject together with practical experience of developing systems using FORTRAN or COBOL within a large operating system environment. Experience of database software is not essential, but is desirable.

Starting salary will depend on qualifications and experience but will be within the range of £8,668 to £10,653. The benefits are those normally associated with a large progressive organisation.

Please write, quoting ref. EP/764001/CW, giving full details of age, qualifications and experience, to: Senior Personnel Officer (London), British Gas, 59 Brynston Street, London W1A 2AZ.

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Targa

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LONDON
A major manufacturing company in North London requires DEC PDP11 Programmers. If you have a minimum of two years' experience in the development and maintenance of the company's financial applications, please apply to the Personnel Officer, Targa, 100, The Quadrant, London W1A 2AZ. The successful candidate will be responsible for the development and maintenance of the company's financial applications. The successful candidate will be responsible for the development and maintenance of the company's financial applications.

CITY
An opportunity has arisen for young programmers with a minimum of 12 months' experience in BASIC & under REXX working with larger packages. Word Processing and financial modelling. The opportunity to learn System Programming and also sales. Benefits include season ticket, membership to BUPA, and Lunchbox Vouchers.

W. SUSSEX
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MIDLANDS RECRUITMENT ADVERTISING FEATURE

A lower cost of living — and scope for development

THE Midlands is certainly not one of the UK's glamour areas, but there are good reasons for living and working there. Vic Sheret has been interviewing four Midlands-dwellers to find out why.

MS G. SHERIDAN of Sherrin Communications.

Q. What do you consider to be the benefits of working and living in the Midlands? A. Obviously, the lower cost of living is one of the main advantages, especially when buying a house and comparing prices with those in the South. There is scope for small businesses to expand, and generally a good environment for development. Being a central location, there is the opportunity to travel freely to most parts of Britain. It is also notable that people in the Midlands have a very favourable attitude towards business-women and are prepared to accept any person capable of doing the work well, irrespective of sex.

Q. How is the recession affecting the Midlands? A. There is no disputing that it is very bad, but there are opportunities in many areas within the computer industry, especially contract work. In general, companies

are looking hard at their finances and they have stopped investing and recruiting. Where this means there are fewer jobs available in the Midlands, the quality of the vacancies on offer remains very high. Summarising the situation in the Midlands, it is certainly no worse than elsewhere in the country. Q. It is the International Year of the Disabled. Do you feel there are sufficient facilities for the disabled within the computer industry in the Midlands? A. Nearly all companies are conscious of the fact that disabled people have much to offer, particularly in programming. There are many special aids available to assist the disabled, and again, we can highlight the programming side. However, companies are aware of the need to do more for the disabled, but there are many obstacles that have yet to be overcome.

MR B. STEVENS of James Baker Associates.

Q. How do salaries compare in the Midlands in relation to the South? A. Generally, salaries are marginally lower than in the South. One finds that people moving from the South are prepared to accept a similar position for the same salary or even less, because of the lower cost of living in the Midlands.

Q. How do you see the standard of equipment at present in use in the Midlands? A. We are most certainly not behind the times, and in some instances are ahead of the times, especially on sites and technology. Again there is very little difference when comparing the Midlands to any other area, although one does find a different emphasis in the Midlands and North where they tend to concentrate on manufacturing systems with less regard to the financial and banking aspects.

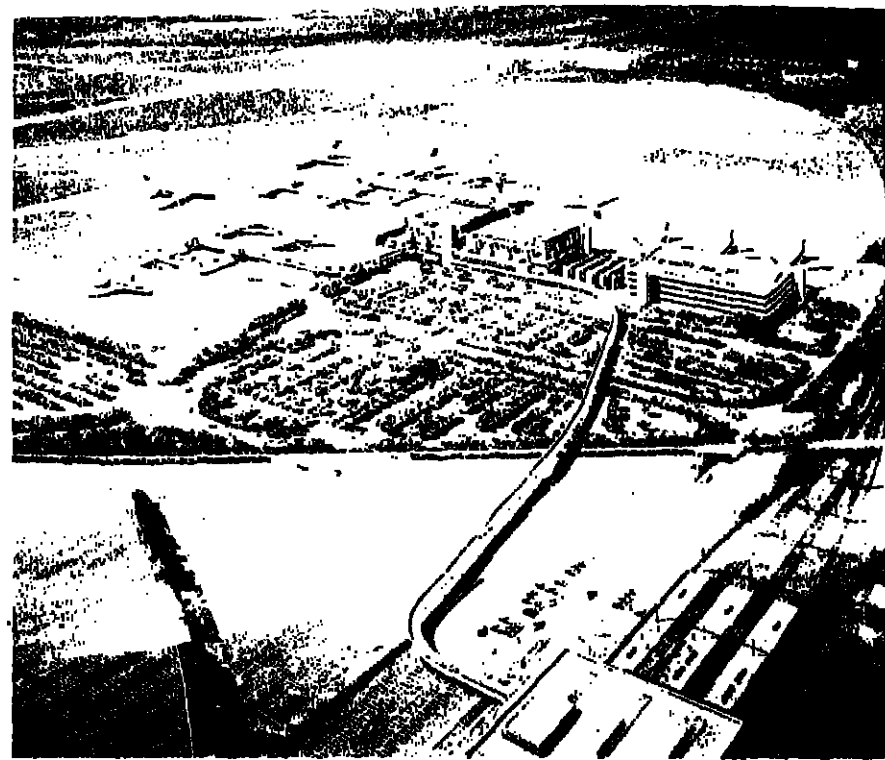
Q. To what extent are formal qualifications taken into

consideration when assessing applicants for jobs? A. There is an increasing emphasis on degree and HND/HNC qualifications, particularly for the lower grade positions but it is true to say that experience is still the overriding factor.

MR R. TOWNS of Austin Knight.

Q. It is usual for companies to offer fringe benefits, but in reality what are these fringe benefits? A. Most companies offer relocation assistance in approved cases and are normally helpful with any legal expenses. Many will also give consideration to out-of-pocket expenses. It is usual to provide a car, but this depends on the level of the position, and the company concerned. The benefits offered by companies in the Midlands are equal to any in the country.

Q. Within the computer industry there are a variety of vacancies. What type of vacancy is predominantly available? A. It would appear most companies have vacancies for programmers on the lower end of the scale and systems analysis seems to be a major problem area.



A much-needed boost to the economic life of the West Midlands should be provided when Birmingham's new airport opens in 1984. The new terminal, pictured above, will eventually cater for nearly 3 million passengers a year and will have a magnetic levitation rail link between it and the Birmingham International railway station and nearby National Exhibition Centre.

Openings in new technology

PLESSEY has one of its leading telecommunications establishments at Beeston, Nottingham. The two major companies of the group operating locally are Plessey Communications and Data Systems Ltd (PC & DS) and Plessey Telecommunications Ltd (PTL). PC & DS manufactures and markets private telephone systems and telephones, switchboards, mining and naval communications systems. PTL produces public electronic telephone exchanges and transmission systems.

As the Nottingham-based company is committed to introducing new computer-controlled products, this requires the recruitment of certain skills not available from its existing staff.

Currently there are still a number of openings in these areas. And over the past two years the company has increased the number of electronic engineering graduates entering the business.

What does Plessey consider are the benefits to its employees of working in the East Midlands?

A company spokesman commented: "Reasonably priced housing is one of the biggest advantages, with a three-bedroomed semi available from as little as £15,000. Communications with the rest of the country, and locally, are first-class and it is possible to live in some attractive locations in Nottinghamshire, Derbyshire and Leicestershire, all within commuting distance of Beeston."

MIDLANDS RECRUITMENT ADVERTISING FEATURE

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This is a senior position within the Computer Operations Department and the job holder will be responsible to the Computer Operations Manager for the efficient utilisation of the Society's Honeywell level 64 computers.

The Society is currently developing on-line systems and plans to install over 160 terminals in branch offices during the next few years.

Applicants should have several years operating experience in a senior capacity within a multi-programming environment and be able to demonstrate a sound technical ability. Level 64 and communications experience would be an advantage.

We can offer an extremely attractive pay and benefits package.

Relocation expenses will be paid if appropriate. Write with brief details of age, experience, and current salary to:

Barrie Day, Personnel Manager, Coventry Economic Building Society, Economic House, P.O. Box 9, High Street, Coventry CV1 5ON. (4841)



COVENTRY ECONOMIC BUILDING SOCIETY

UNIVERSITY OF ASTON IN BIRMINGHAM
DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING
MATHEMATICAL PROGRAMMING

TWO PART-TIME RESEARCH ASSISTANTS

Two part-time research assistants are needed to help with research in mathematical modelling and simulation of dynamic systems. The work will be done in the Department of Electrical & Electronic Engineering, University of Aston in Birmingham. Applicants should preferably be qualified to honours degree standard in mathematics, computer science, statistics or other relevant subject.

The appointments will be for a period of up to three years and the salary will be payable pro-rata to the full-time scale £5,265 - £7,700 per annum.

Application forms and further particulars may be obtained from the Staff Officer (quoting Ref: 462/102), University of Aston in Birmingham, Gosta Green, Birmingham B4 7ET. Tel: 021-359 2611, Ext. 2611. Closing date for the receipt of applications is 10th April, 1981. (4852)

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Opportunity for a suitably experienced applicant to take responsibility for a small team supporting system software on a Burroughs Large System.

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Challenging posts for suitably experienced applicants capable of leading projects related either to faculty or administrative support.

Proposals are being formulated for new projects relating to a campus network and database implementation. The experience offered should prove rewarding to the right candidate.

Application forms and further particulars available from Staffing Officer, Leicester Polytechnic, P.O. Box 148, Leicester LE1 9BH. Tel: (0533) 551581 Ext. 2503/1.

The above positions are open to men and women.

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For the above posts plus many more apply in confidence to: IVOR ANDERSON OR LAURENCE REDDY quoting appropriate ref.

We are always pleased to hear from experienced Analysts/Programmers looking to develop their career.

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FULL-TIME AND TEMPORARY POSTS
AT SENIOR LECTURER/LECTURER GRADE II IN COMPUTING

Applications are invited for posts of Senior Lecturer/Lecturer Grade II in the Department of Computing. Candidates should be able to offer a specialist area of computing at Honours Degree level such as Data Processing, Systems Analysis, Information Systems, but applicants with other teaching experience in computing will be considered.

In addition, applications are invited for temporary posts of Senior Lecturer/Lecturer Grade II in the Department of Computing. Candidates should be able to teach Data Processing and Systems Analysis, but applicants with other teaching experience in computing will be considered. These latter two posts are for a period of two years only but there may be the possibility for transfer into full-time posts later.

Salary scale:
Senior Lecturer - £8,952-£10,520 (bar) - £11,250
Lecturer Grade II - £5,012-£6,702

Application forms and further details may be obtained from the Deputy Director (Staffing), North Staffordshire Polytechnic, College Road, Stoke-on-Trent ST4 2DE. (4439)

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DIRECT LINE 01-661 0121

Midlands Opportunities

PROJECT LEADER High Salary + Car

An established software house requires candidates with a minimum of 5 years experience working within a machine environment on IBM mainframes. Knowledge of IMS Database, OS and CICS is desirable.

ANALYST/PROGRAMMERS Up to £9,500

A manufacturing company using IBM mainframe equipment is seeking to recruit an additional Analyst/Programmer. Applicants should have at least 2 years experience in a commercial or manufacturing environment and be competent in Cobol. Opportunity exists for some foreign travel.

ANALYSTS £Negotiable

Required with upwards of 2 years experience on financial and/or commercial applications. A knowledge of ICL hardware whilst preferred is not essential.

PROGRAMMERS £Negotiable

A minimum of 18 months Cobol experience ideally on IBM hardware would qualify Programmers to fulfil one of several positions currently available.

CONTRACT STAFF

As a newly formed section of our Recruitment Service we are now interested in hearing from Contract Staff in all areas of DP who are currently seeking further work or wish to register their details with us.

For further information contact ROGER CARR or HAZEL FOGGIN.

Blackwood Associates Recruitment Consultants

28 Waterloo Street, Birmingham B2 5TJ. Telephone: 021-233 2321 (24 hr service)

Project Leader

At least 5 years' experience specialising in production central manufacturing systems. Involves customer contact at all levels. Area: Leicestershire. Salary to £9,500. Ref. RA 342

Systems Analyst

At least 3 years' experience using Large ICL Mainframe, knowledge of communication and distributed processing. Area: South Birmingham. Salary £10,500. Ref. SA 309

Senior Systems Analyst

At least 5 years in DP experience in sales order processing stock control systems. On line environment knowledge of Cobol. Area: N. Solihull. Salary to £10,000. Ref. SA 299

Systems Analyst

At least 4 years' DP experience including IBM, IMS and Database. Area: Coventry. Salary to £9,000. Ref. 310

Systems Analyst

At least 1 year of commercial systems. Area: Derbyshire. Salary to £7,500. Ref. SA 310

Senior Systems Analyst

Around 5 years' commercial experience, knowledge of production control an advantage. Area: South Warwickshire. Salary to £8,000. Ref. SA 320

Analyst Programmer

At least 4 years' commercial systems ICL Hardware preferred. Area: Nottingham. Salary to £8,500. Ref. 328

Chief Programmer

At least 5 years in DP Hardware experience. ICL 1900 or 2840. languages Cobol, PL/I. Area: Birmingham. Salary to £7,750. Ref. P638

Analyst Programmer

At least 2 years' Cobol with distributed processing experience. Area: Birmingham. Salary to £7,500. Ref. SA 306

Senior Software Programmer

At least 4 years working in a large IBM Mainframe environment, knowledge of MVS & JES3 essential. Area: Leicestershire. Salary to £9,000. Ref. P6471

Database Analyst Programmer

At least 3 years' Cobol with Database management systems experience. Area: Coventry. Salary to £7,500. Ref. SA 299

Software Support Analyst Programmer

At least 3 years' software experience using off line and batch systems. Area: Coventry. Salary to £7,500. Ref. SA 299/1

Programmer At least 18 months' Cobol on line Database environment. Area: Lincolnshire. Salary to £7,000. Ref. P654

Senior Operators At least 2 years operating large IBM 370 Mainframe under OS MVS JES3 and IBM utilities. Area: Worcester & Shropshire. Salaries to £8,300. Ref. 0212

If none of these jobs suit you, we have many more that may.

PLEASE TELEPHONE 021-661 0111.

24 hr ANSWERING SERVICE OR SEND CV. NO STAMP REQUIRED TO:

MARTINS COMPUTER SERVICES

FREEMONT, WESTERN HOUSE, SPALLS BROOK, QUEENSWAY, BIRMINGHAM B5 4AR (4802)

Esoteric Programming Skills?

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Midlands: Alpha Tower, Birmingham: B1 1BB
Computer People Midlands (R0004)

Make the move to Boots - maximise your potential!

Here is the ideal opportunity to gain the experience your career needs. Few companies have a wider spread of activities and few have higher performance standards in data management.

From a park-like 300 acre site at Beeston, Nottingham, Boots run one of the country's largest, most profitable and diverse retail chains and manufacturing operations.

Software Programming

Our Technical Support Group handles a variety of short term projects ranging from day-to-day problem solving to planning and implementing major software developments. Applicants must have IBM Assembly experience. A knowledge of MVS and CICS is desirable.

Junior Project Management

We need Junior Managers to lead and develop teams in the following project areas: Production, Marketing and Research. In each case approximately 3 years experience is required.

Training and Development

This position is to teach programming, improve the standard of programming and systems analysis at all levels and advise senior staff on new techniques. This could form the next step in the career development of a really good Analyst/Programmer or Programmer with IBM/COBOL or ASSEMBLER experience.

Boots Offer Rewards as well as Opportunities

Salaries range from £7-9k depending on experience. There are valuable staff purchase privileges and profit sharing bonus. Relocation expenses will be paid if applicable.

Want to know more? Then write or telephone for a personal data form to: Jim Hallam, Employment Manager, (Commercial), The Boots Company Limited, Head Office, Beeston, Nottingham, NG2 3AA. Telephone Nottingham (0602) 56111 ext. 2321.

The above positions are open to both male and female applicants.

Leicester Polytechnic COMPUTER CENTRE SYSTEM SUPPORT PROJECT LEADER (Systems)

£8235 - £9150
Opportunity for a suitably experienced applicant to take responsibility for a small team supporting system software on a Burroughs Large System.

USER SUPPORT PROJECT LEADER (Applications)

£8235 - £9150
Challenging posts for suitably experienced applicants capable of leading projects related either to faculty or administrative support.

Proposals are being formulated for new projects relating to a campus network and database implementation. The experience offered should prove rewarding to the right candidate.

Application forms and further particulars available from Staffing Officer, Leicester Polytechnic, P.O. Box 148, Leicester LE1 9BH. Tel: (0533) 551581 Ext. 2503/1.

The above positions are open to men and women.

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Project Leader

At least 5 years' experience specialising in production central manufacturing systems. Involves customer contact at all levels. Area: Leicestershire. Salary to £9,500. Ref. RA 342

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At least 3 years' experience using Large ICL Mainframe, knowledge of communication and distributed processing. Area: South Birmingham. Salary £10,500. Ref. SA 309

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PLEASE TELEPHONE 021-661 0111.

24 hr ANSWERING SERVICE OR SEND CV. NO STAMP REQUIRED TO:

MARTINS COMPUTER SERVICES

FREEMONT, WESTERN HOUSE, SPALLS BROOK, QUEENSWAY, BIRMINGHAM B5 4AR (4802)

Challenging the climate of recession more dramatically than any comparable journal, Computer Weekly announces a major circulation increase — to 100,000 — breaking the six-figure barrier for the first time in the history of U.K. computer journals.

More important than the overall circulation increase is the increase in each major job category to a level where Computer Weekly now leads all other journals in the field.

The new circulation level will be substantiated in the Audit Bureau of Circulations (ABC) returns for the six months period from January-June 1981.

PROJECT LEADER

HANTS

TO £12,000

- ★ Exp. Project Leader or Outstanding Analyst/Programmer
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Our client's business is the creative use of advanced electronics to solve industrial problems across a wide range of industries.

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You will have difficulty staying in the same project for long! Progression is important to this company.

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computer people rely on

KEY OPERATIONS ASSISTANCE LTD.

IBM OPERATIONS MANAGER

c £13,000+

A leading concern based in Central London currently require an individual with full and initiative to advise on and implement a new organisational structure within their expanding computer installation. Currently based on large IBM 370 hardware, conversion to IBM 4341's with an IMS Database facility is planned for mid '81. It is necessary for candidates to have already gained management experience in a customer orientated environment, possess excellent interpersonal communication skills and have had exposure to database usage, preferably IMS. This position provides an unequalled career opportunity to be involved in an international organisation with worldwide commitments. A comprehensive benefit package, which includes mortgage subsidy, is offered together with an excellent negotiable salary.

IBM SHIFT LEADER

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A progressive financial concern situated in Central London require a highly motivated individual to supervise the efficient running of a shift. The company rely heavily on their computer facilities to provide up-to-date information regarding worldwide financial transactions and are therefore committed to keeping abreast of technical developments and maintaining a highly professional computer team.

Candidates must have a minimum of 4 years' IBM experience with a thorough knowledge of DOS/VS, POWER/VS, associated utilities and JCL. CICS and in addition to the excellent salary, the company offer mortgage subsidy and life assurance. This position is worked on a two-shift system covering 07.30-22.30 Monday to Friday.

For more information on the above and other IBM vacancies, technical and management — please ring JANET WARREN. All enquiries are treated confidentially.

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PROJECT LEADER ICL 2904

CITY

to £10,000

Our clients are a leading member of the London commodity market who seek an enthusiastic project leader for their ICL installation.

Candidates, who will lead a small team, should be aged about 30, have a programming and analysis background and have successfully completed 1 or 2 projects, from design through to implementation.

Some U.K. travel is involved and the accent is on enthusiasm.

In addition to an excellent salary, the company offers a non-contributory pension scheme, and free BUPA. D.5111

PROGRAMMERS IBM 370

LONDON

c. £8,000

As a result of continued expansion, a very successful trading company on the fringe of the city urgently require still more PL1 programmers.

Candidates should have a minimum of 2 years' PL1 programming, which has been gained in a team environment with involvement in at least one medium system. IBM Cobol programmers may also apply.

Apart from the salary the company offers good chances for promotion and numerous benefits, befitting an organisation of their reputation. D.8047

JNR. ANALYST/PROGRAMMERS IBM 4341

LONDON

to c. £8,500

Openings exist within a leading oil company for junior analyst/programmers who can show a successful career path within the computer industry together with a good educational record.

Their requirement for at least one year's commercial COBOL programming on IBM 370 or 4300 machinery together with at least good 'A' levels or, preferably, a degree.

In return they offer a definite career structure with ample training facilities, and the very best in company benefits and working conditions. D.8027

PROGRAMMER/ANALYST RPG II

LONDON, CITY

To £10,000

An excellent opportunity has arisen for a Programmer/analyst who would like more involvement with systems design. The company you will be working for are totally involved in banking and are American owned.

Ideally you should have between 2-4 years' RPGII Programming experience and a good theoretical knowledge of system design. A good knowledge of banking applications is also required.

The company offer an excellent career path coupled with regular training courses and benefits including subsidised restaurant, sports and social club and mortgage facilities at well below building society rates. M.5137

RPG II PROGRAMMERS

LONDON, H. COUNTIES

To £10,000

Datascene have recently taken a considerable number of vacancies for RPG II Programmers in London and the Home Counties.

The range of industries within the client database are wide ranging but include Petrochemical, Banking, Insurance, Engineering and Software houses.

Ideally you should have at least one year's experience but preferably 18 months' together with a good standard of education.

Progression within the various departments is good as all companies offer career progression. M.GEN

BASIC, BASIC + PROGRAMMERS

LONDON/CITY

£7,500-£9,500

We are in contract with a number of Banks who are seeking programmers with upwards of eighteen months' experience in business BASIC, BASIC +, BASIC +2, or ALMS. Successful applicants can expect to be working in a busy and real-time environment on applications such as foreign exchange and eurobond. Opportunities for career progression are excellent and the employment packages offered include interest free season ticket loans, productivity bonus schemes, staff restaurant/lunch vouchers and low interest mortgage facilities. R.GEN 2

ANALYST/PROGRAMMERS & PROGRAMMERS

S.W. LONDON

£7,500-£10,500

A leading manufacturing company require an experienced Senior Analyst/Programmer, one Analyst/Programmer and one Programmer to complement their existing team. Experience required ranges from 2-5 years' of on-line working with COBOL. A sound knowledge of commercial applications and project management will be advantageous to those applicants applying for the senior positions offered. The company benefits include five weeks' holiday, product discount, subsidised canteen and Pension Scheme after one year's employment. R.8013

HEWLETT PACKARD 3000 COBOL

LONDON/HOME COUNTIES

£7,500-£9,000

We have several Hewlett Packard clients with current vacancies for experienced Analysts, Analyst/Programmers and Programmers. Experience required is from 1-2 years' upwards on this equipment with a good knowledge of commercial or insurance applications and a good standard of education. Progression within the various companies is excellent as all offer solid career growth. A wide range of company benefits are offered and represent fine opportunities for suitably qualified applicants. R.GEN 1

The above vacancies are only a small selection from those currently on our files and we are always delighted to talk to experienced systems and programming staff wishing to further their careers.

Datascene International Limited
Scapellato House
188-178 Regent Street
London W1R 7PE, Tel: 25881

01-439 7871
24 hour answer phone

Recruitment LOGISTIX In Informatics

Communications Software Southern Germany: Salary to £15K

Communications Engineers from Programmer/Analyst to Team Leader level are urgently required by one of Europe's leading suppliers of communications equipment. Software development teams, based in their R & D Headquarters, are currently engaged in the design and construction of an advanced telephony system based on Intel 8086 microprocessors. All applicants must possess at least two years' real-time software development experience on any leading mini or micro-computer

and be fluent in one high-level problem oriented language such as PASCAL, COBOL or RPL-2. For the more senior positions it is also necessary to be familiar with an Assembly language and be capable of supervising a small team of Programmers and Analysts. Initial interviews will be held in London and those who are successful will be invited to the Company's premises prior to employment being made. Ref. 1/12/A.

Technical Consultants Central London: Salaries to £15K

Outstanding opportunities have arisen for candidates to join a long-established and successful computer consultancy based in Central London. You should be aged 25-34 years and educated to at least degree level. It is essential that all applicants possess good personal communication skills and demonstrate the ability to solve problems both quickly and professionally. Of particular interest

will be candidates who have experience in Telecommunications, Distributed Processing or Data Base Management. Working as a member of a small team, you will not only be involved in the implementation of systems, but also in corporate strategy study, operational research and marketing. Ref. 1/12/B.

Technical & Commercial S/W E.E.C.: Pkg. to £16K

Technical and Commercial Software Specialists are urgently sought by a leading Dutch Systems and Software House. Applicants with a commercial background will be required to have at least 3 years' programming experience in Assembly, Basic or PL/I on small business interactive systems. Of special interest will be candidates with exposure

to established Structured Programming techniques. Technically-orientated applicants will be expected to possess expertise in Communications Networks, Message Switching or Process Control Systems development. Ancillary benefits are excellent and successful applicants will be offered full relocation assistance. Ref. 1/12/C.

Commercial Programmers Berks/Surrey: Salary to £8K

Commercial Applications Programmers with at least 2 years' experience are urgently sought by a small, profitable Systems and Software House. It is essential that all applicants are familiar with at least one high-level language, preferably Fortran, but those fluent in Cobol or other commercially orientated languages are encouraged to apply. Our

clients have a stated preference for candidates who have worked on DEC's PDP11 range but particular hardware experience is not a limiting factor. These positions represent a rare opportunity for successful applicants to enhance their technical skills whilst working in an attractive rural setting. Ref. 1/12/D.

Snr. Systems Analysts City: Salary to £12K

As a result of recently upgrading its installation, a leading City-based company has a number of vacancies for Senior Systems Analysts. Respondents will be expected to have participated in the development of at least one medium to large computer system, preferably utilising IBM compatible Database and Teleprocessing Software. Whilst

not essential, it is desirable for candidates to have experience of cost benefit analysis in a commercial/business environment. Successful applicants will be responsible for the supervision of a team of up to 5 Analysts and the ability to communicate at all levels as well as motivate staff are therefore prime requirements. Ref. 1/12/E.

Logitix, 10 Grenville Place London SW7 4RW

01-373 3063



Telex: 28800

(4023)

D.P. Consultants

Minicomputer Technology

Bushey, Herts.

£ high negotiable

DP Consultants, this is your opportunity to be involved at the heart of our exciting plan to link the various Rank Xerox companies throughout Europe by means of a network of distributed processing systems. We are utilising Honeywell level 6 and DEC minicomputers to communicate with the large IBM mainframes in three International Data Centres at Bushey, Park and Düsseldorf.

The Minicomputer Technology Groups responsibility includes:

- Providing a consultancy service on the suitability of minicomputers for particular applications.
- Evaluation and selection of hardware and software.
- Support to users during and post implementation of minicomputer systems.
- Development, distribution and support of specialised communications interface software.

Applicants should have at least 4 years' relevant experience as a minicomputer Support Specialist. Opportunities exist at both technical and supervisory level.

The salary and benefits package is excellent and includes company pension scheme, free life insurance, free BUPA, four weeks holiday — rising to five, generous relocation package and a subsidised staff restaurant.

Please write with career details or telephone for an application form to Ruth Kallinowicz, Rank Xerox Ltd., Phoenix House, Kemp Place, Bushey, Herts. Tel: 01-950 4030, Ext. 286.

RANK XEROX

IMS & Systems Support Specialists

Bushey, Herts

Salary £ High-negotiable

Rank Xerox provides centralised data processing through three International Data Centres located at Bushey, Paris and Dusseldorf. These act as a "service bureaux" to the various Rank Xerox companies throughout Europe by providing them with large IBM-mainframe computing facilities running MVS and JES3.

Our Customer Support Group, based at Bushey, provides an extensive range of technical services and support activities to all our users who are located in more than twenty sites in 12 European countries.

Due to continued expansion we can offer a number of challenging and interesting positions to experienced DP professionals wishing to utilize and extend their skills in a support environment.

Interactive Systems Support

This group is responsible for all systems programming work relating to database and data communications software. We are seeking individuals who have:

- sound knowledge of IMS DB/DC software and/or
 - several years experience of developing IMS DB/DC applications.
- Successful applicants will join the existing team and be expected to make a major contribution to the implementation of IMS DB/DC throughout Rank Xerox.

Batch Systems Support

This group is responsible for evaluating commercial utility software packages, providing technical support services to user sites and assisting users in planning and using the data security facilities (RACF). We are seeking individuals who have:

- a sound knowledge of using Assembler under an IBM/OS operating system preferably MVS
- some experience in IBM/OS operating system software
- knowledge of RACF and how it works (not essential)
- experience of using/installing vendor software
- some COBOL/high-level language experience.

Successful applicants will be expected to be self-motivating, able to work with a minimum of supervision and to make a significant contribution to the work of the group.

Applicants, should have a minimum of 4 years' DP experience of which 2 years should have been in an IBM environment. The salary and benefits package is excellent and includes company pension scheme, free life insurance, free BUPA, four weeks holiday - rising to five, generous relocation package and subsidised staff restaurant.

Please write with career details or telephone for further information and an application form to Ruth Kalinowicz, Rank Xerox Ltd., Phoenix House, Kemp Place, Bushey, Herts. Tel: 01-950 4030 Ext. 286.

RANK XEROX

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CITY/E.C.1

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An opportunity has arisen for a well-qualified computer professional to join a subsidiary of a major International Financial Group as Data Processing Manager.

Ideally you will portray the following levels of experience and skill:

1. A sound D.P. background having developed your career from Programming through Systems Analysis and Design and currently occupying a responsible management position.
2. You will have experience of working with sophisticated On-line/Real Time systems preferably related to financially based applications.
3. Familiarity with more than one level of computer mainframe, with particular experience based upon PDP 1170 hardware will prove highly attractive.
4. We would expect you to be experienced in managing D.P. personnel at all levels and to portray the ability to communicate well with user personnel and departments.

THIS IS AN OUTSTANDING OPPORTUNITY FOR A PERSON TO JOIN A FORWARD-LOOKING AND DEVELOPING COMPANY INTERESTED IN TAKING ADVANTAGE OF NEW D.P. TECHNOLOGY AND EXPANDING ITS D.P. FACILITIES FOR THE BENEFIT OF ITS USER DEPARTMENTS. OUR CLIENTS WISH TO MAKE THIS NEW APPOINTMENT BY THE END OF MARCH AND THEREFORE RING US (24-HOUR ANSWERING SERVICE) OR SEND YOUR C.V. NOW WITH A VIEW TO ARRANGING AN EARLY INTERVIEW.

INBUCON MANAGEMENT CONSULTANTS LIMITED
D.P. Appointments & Contract Personnel
Greenock House, 19 Cuckfield Road, Hurstpierpoint,
Sussex BN6 9RP. Telephone: Hurstpierpoint (0273) 833848

INBUCON

(1716)

SALES BIT

It couldn't happen in DP—could it?

OUR administrative office decided it needed a new photocopier — nothing fancy, you understand, just a desk-top job that could handle plain paper...

We had seen several Press advertisements telling us how many different companies had the best photocopier in the world, and decided to call a few of them to see what they had to offer.

However, being a sales orientated organisation, with strong altruistic feelings towards salesmen, we decided to make it easy for them, stating the type of copier we wanted, the number of copies we were likely to need within a given period, the type of printing method we preferred, the sort of money we were prepared to pay, where we were located, etc.

Then we waited for all the friendly neighbourhood salesmen to come rushing to our door.

After a week, we were beginning to think no one was interested in our business. But then one of them made telephone contact and said he would like to come and demonstrate a machine, making an appointment for 11 am the following day.

At 10.55 am we had a phone call to say he would be a little late. We thought it best not to get involved in any of our work, if it meant having to leave off again as soon as he arrived.

Eventually he arrived, an hour late, asking if we had someone available to help him carry a photocopier up the stairs, as his assistant had failed to show up altogether. We were not amused.

As it happened, there was no one of sufficient physical stature to give him the lift he required. He wasn't very pleased and protested that no one had told him we were located on the first floor, and that there was no lift.

Consequently he then disappeared to solicit assistance from some innocent by-passer.

Meanwhile, back with the other photocopier manufacturers, and some three weeks later we have seen only two other salesmen from the six companies we contacted.

And the market leader has still not got round to acknowledging our letter and phone call.

I only tell this true story for academic interest. I mean to say, this sort of thing could never happen in the computer industry, could it?

Alan Williams

COURSES

SENIOR executives with little or no practical computer experience may benefit from a series of five-day residential courses, organised by Counting House Computers.

On May 11-12, the Electronic Mail - Technology Awareness seminar is given in a programme of short courses organised by Control Data.

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INSTRUCTION on a variety of data processing skills is given in a programme of short courses organised by Control Data.

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SMR

Sales & Marketing Recruiters Ltd

Victory House, 99 Regent Street, London W1R 7HB

A Sales and Marketing Services Company
London & Midlands

Sell in Europe!

This is a rare opportunity for successful senior sales people who are attracted by the stimulation, challenge and career advancement of a move into international selling.

We have been retained by a specialist division within a major international computer manufacturer to locate a top-flight sales person for the role of

Manager of Distributor Sales (Europe)

This will involve responsibility for the marketing of a very competitive and technologically advanced range of micro-computer based systems and intelligent terminals through a network of European distributors. The job is UK based and will be substantially devoted to direct selling activity, but enhancement of the sales operation is envisaged as revenues expand.

We are seeking accomplished sales people with at least three years' experience of selling computer hardware at the OEM, distributor or end user level. All applicants must clearly demonstrate an ability to negotiate at the highest possible level within a variety of international situations. Existing experience of selling within Europe and the ability to speak French and/or German will be advantageous but not essential.

On target earnings will be in the order of

£20,000 + Company Car

Please submit complete career details to Alan Williams quoting reference CAN/103.

Tel: 01-734 9776

Midlands and North - Lichfield (0543) 256612
Answering Service after 6 pm and weekends
SALES TRAINING, MARKET RESEARCH, RECRUITMENT

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TECHNICAL SUPPORT - NEW LAUNCH - £14000 + 2-LTR. CAR - TRAIN U.S.A.

One of the great American innovators in the computer industry is launching a major new product range. Support positions are open for engineers with IBM experience seeking real challenge and management opportunities.

FIELD SYSTEMS ENGINEERS - LONDON/HOME COUNTIES
START £2000 + B/T + R/O + CAR + BUPA

High growth mini manufacturer - two new branch offices within 100 miles - seeks promotable young engineers - train U.S. Engineers - next more technical support

FIELD SERVICE - READING, S. & W. LONDON
START £7200 + B/T + CAR + TRAINING

Mini manufacturer is offering opportunities for career development to field service engineers, full product training on state of the art minis, dynamic management team and early promotion

For the benefits of working for this friendly company contact Alan Williams for arranged early interviews with any of the above

01-661 0121 (16 lines), also many others.
ELECTRONICS PEOPLE (AGV)

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D.P. Professionals

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